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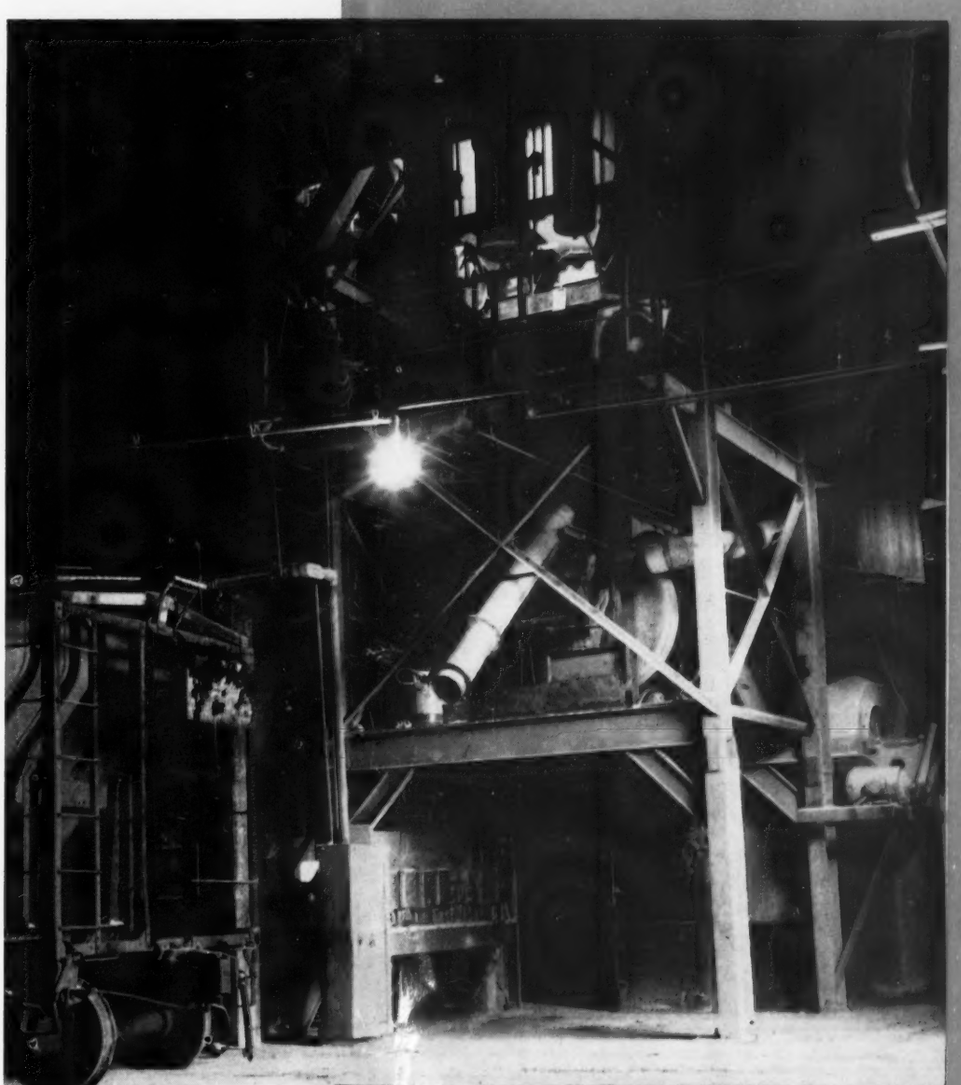

CONVERTED ROUNDHOUSE—How Michiana Chemical Co. uses old railroad roundhouse for fertilizer plant is told on page 6.

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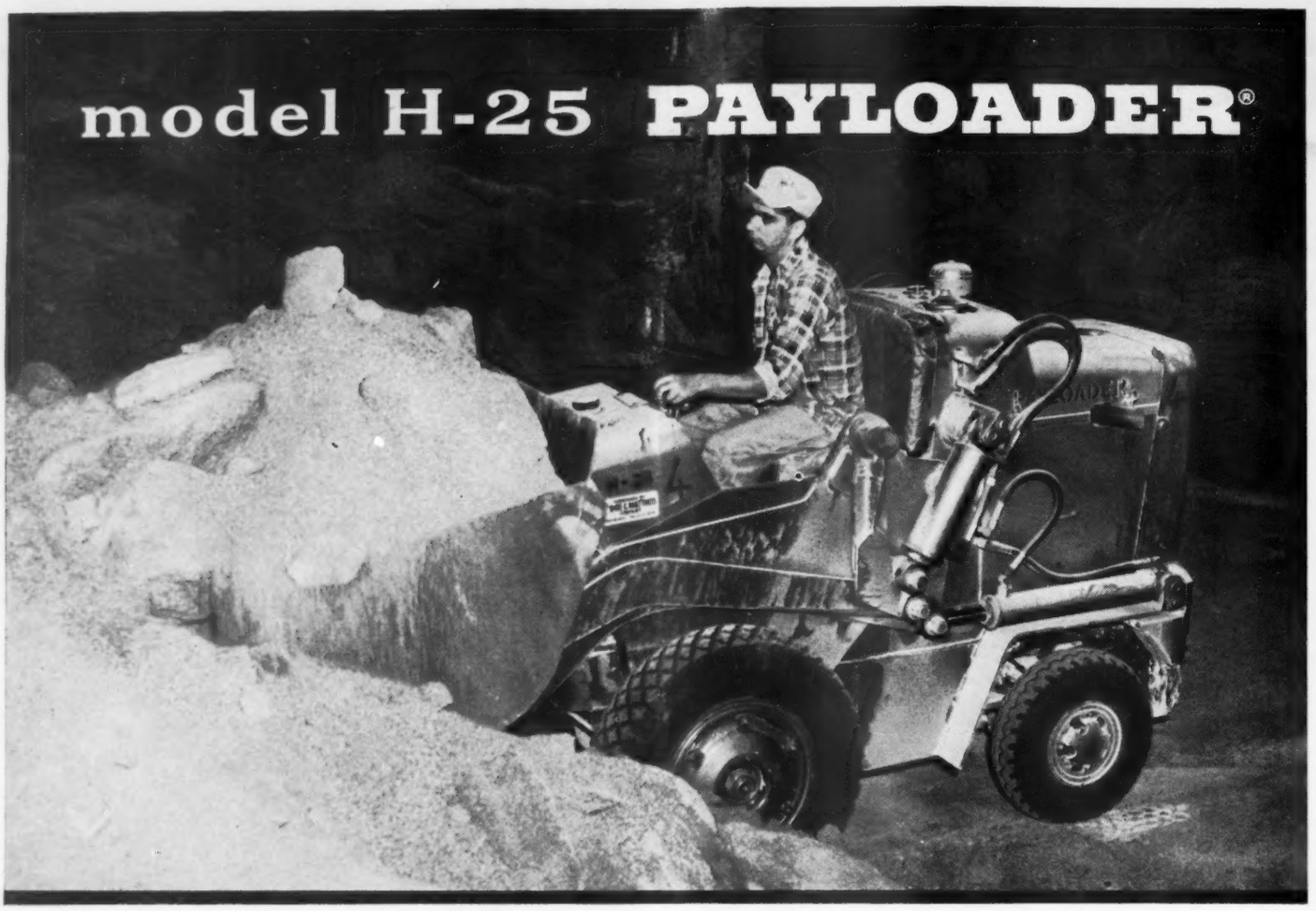

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Eastern States Farmers Exchange, Inc. purchased four "PAYLOADER" units as a result of competitive tests conducted at their Cambridge, Mass. plant. In these tests, a Model H-25 "PAYLOADER" moved material at a rate of 90 cu. yds. per hour on a 150-ft. (one-way) haul distance — outproduced the other tractor-shovels in the test.

This fertilizer manufacturer serves Pennsylvania, Maryland and the New England States . . . has four plants and a fifth under construction.

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USDA REPORT SAYS . . .

Fertilizer Consumption Down Slightly in 1958 Fiscal Year

FERTILIZER CONSUMPTION in the United States for the year ended June 30, 1958, was 22,515,763 tons, according to figures just released by the fertilizer investigations research branch of the Agricultural Research Service, USDA. It comprised 21,576,035 tons of products containing one or more of the primary nutrients and 939,728 tons of secondary and trace nutrient materials.

The report states that consumption of fertilizers containing primary plant nutrients was 189,733 tons (0.9%) below the 21,765,768 tons reported in 1956-57.

According to the report, the national drop in total consumption was due to a decrease of 349,784 tons (2.4%) of mixtures. However, this was partly offset by an increase of 160,051 tons (2.3%) of direct application materials.

This was the fifth consecutive year since the peak of 1952-53, that the quantity of mixtures has decreased. The consumption of direct application materials, however, has increased annually except in 1952-53 and 1953-54.

The decrease in total consumption was chiefly in the South Atlantic and East South Central regions. Consumption in the North Central, Mountain, and Pacific regions continued to make large gains.

Of the mixtures, there were 2,156 grades reported, totaling 14,353,023 tons. In addition, over 500 mixtures, many of which are duplicated in the total mentioned above, but not reported by grades, were used in California. In addition, an unknown number was reported as miscellaneous tonnages in other states.

Mixtures consumed in 1957-58 represented 63.7% of the quantity of all fertilizers, compared with 64.7% for the preceding year.

Mixtures containing nitrogen, phosphate, and potash represented 90.2% of the total tonnage of mixtures while the other types (N-P, P-K, N-K) accounted for 2.4%, 6.7% and 1.7% respectively.

TABLE 1.—Kinds of Fertilizer Consumed in Regions and United States Year Ended June 30, 1958[1]

Tons

Kind	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Hawaii and Puerto Rico 2/	United States
MIXTURES: N-P-K	336,487	1,622,205	4,227,965	3,045,300	995,486	1,611,294	570,566	37,023	290,215	204,828	12,941,369
N-P	26	321	156	49,765	140,017	5,459	32,037	31,534	80,158	2,112	341,585
P-K	30,365	105,584	178,045	230,400	67,163	175,412	28,817	545	2,992	3,732	823,055
N-K	0	59	209,753	429	79	3,375	7	48	2,253	31,011	247,014
CHEMICAL NITROGEN MATERIALS											
Ammonia, anhydrous	0	2,485	25,175	57,151	139,082	51,832	139,927	42,754	124,256	772	583,434
Ammonia, aqua	0	0	846	2,261	9,401	46	7,844	26,937	289,640	28,087	365,062
Ammonium nitrate 3/	4,780	31,816	136,369	138,098	243,040	284,077	106,144	70,272	102,314	0	1,116,908
Ammonium nitrate-limestone mixtures	162	2,195	223,944	2,025	173	30,797	534	3,622	60	0	263,512
Ammonium sulfate	531	4,499	11,673	97,108	11,771	11,922	97,778	63,170	226,004	52,655	577,111
Calcium cyanamide	1,379	9,033	8,858	1,028	189	9,642	6,467	1,173	8,579	0	46,348
Calcium nitrate	2	2	10,118	115	0	146	132	11,960	34,788	111	57,374
Nitrogen solutions	904	3,692	83,748	59,373	82,673	9,420	22,686	5,668	56,382	0	324,546
Sodium nitrate	1,582	10,307	241,814	1,382	286	129,968	49,157	493	386	134	435,509
Urea	1,076	3,661	3,814	11,950	3,796	1,212	18,700	19,034	27,044	8,096	98,383
Other	234	2,214	872	2,805	600	37	472	976	980	0	9,190
NATURAL ORGANIC MATERIALS											
Blood, dried	3	29	35	0	0	0	0	19	2,170	0	2,256
Castor pomace	1,519	219	2,600	0	0	25	0	0	920	0	5,283
Compost 3/	476	504	0	7,176	4,049	0	2,342	370	1,920	0	16,838
Cottonseed meal 4/	6,517	183	1,502	0	0	5	0	0	30	0	8,237
Fish scrap, meal, emulsions	423	16	0	15	0	0	8	1,270	0	0	1,732
Manures, dried	4,630	13,732	4,215	7,804	4,383	1,157	2,619	2,190	261,786	0	302,516
Sewage sludge, activated	7,403	14,421	8,733	30,512	8,161	1,034	3,388	4,690	18,567	100	97,008
Sewage sludge, other	0	0	0	740	92	19	0	265	35,621	0	36,737
Tankage, animal	7	410	1	0	0	0	0	0	1,450	0	1,868
Tankage, process	3,366	7,751	3,779	397	1	0	0	0	0	10	15,304
Other	751	138	1,015	0	0	0	8	100	3,461	0	5,473
PHOSPHATE MATERIALS											
Ammonium phosphate: 11-48 5/	0	454	45	9,628	45,025	11	3,539	9,158	14,111	1,095	83,066
Ammonium phosphate: 13-39 5/	0	0	0	220	18,372	24	14,935	3,759	6,166	0	45,476
Ammonium phosphate sulfate: 16-20 5/	0	0	0	948	74,635	73	67,317	46,996	104,785	261	295,015
Ammonium phosphate nitrate: 27-14 5/	0	0	0	0	3,212	0	0	4,336	10,135	0	17,683
Ammoniated superphosphate 6/	0	0	37	0	0	0	0	0	3,012	0	3,049
Basic slag	0	0	18,900	0	0	122,000	3,322	0	0	0	144,222
Bonemeal: raw and steamed	1,469	4,115	1,260	1,925	243	307	386	2	1,902	0	11,609
Calcium metaphosphate	0	590	2,478	11,617	15,739	14,122	856	272	26	0	45,700
Diammonium phosphate: 21-53 5/	0	113	1,541	3,796	5,502	3,456	3,027	7,803	1,073	1,102	27,413
Phosphoric acid	0	0	0	0	0	0	1,611	10,781	10,675	0	23,067
Phosphate rock	274	7,492	18,204	564,983	215,208	8,968	16,414	80	824	2,804	835,251
Colloidal phosphate	0	80	317	1,383	3,120	7,649	2,915	120	710	0	16,294
Superphosphate: 18%	1,824	7,753	14,896	16,078	16,963	19,340	0	0	3,442	0	80,296
" 19%	6,556	36	9,276	0	14	105	0	8,766	67,173	0	91,940
" 20-22%	21,907	61,165	26,257	42,988	24,572	56,122	58,708	6,879	1,309	5,747	305,654
" 23-41%	50	0	0	3,499	636	0	577	1,771	149	0	6,582
" 42-44%	0	0	0	0	21,038	0	1	28,196	7,668	0	56,903
" 45%	1	887	120	24,324	40,540	700	19,899	38,523	16,188	2	141,184
" 46%	60	2,013	5,427	44,231	68,527	2,427	20,660	4,504	3,643	1,725	153,217
" 47-48%	0	25	158	4,389	1,981	3,046	1,775	4,745	0	0	16,119
" 49-52%	0	0	0	238	84	38	18	0	0	0	378
Other	256	0	2,845	0	0	577	0	0	69	0	3,747
POTASH MATERIALS											
Cotton hull ashes	318	0	0	0	0	0	0	0	0	0	318
Lime-potash mixtures 7/	0	91	20,957	0	0	6,280	0	0	0	0	27,328
Manure salts	0	5	324	0	0	0	28	0	0	0	357
Potassium chloride: 50%	152	219	354	4,198	299	336	561	140	135	0	6,394
" 60%	1,678	4,625	35,252	187,179	45,095	40,956	28,348	1,492	5,884	7,887	358,396
" magnesium sulfate	68	1,354	1,981	3,369	355	1,137	1,245	41	264	5	9,819
" sodium nitrate 6/	174	1	13,290	39	0	1,256	18	0	0	0	14,778
" sulfate	114	1,319	5,246	3,480	2	6,411	120	1,125	6,864	2,106	26,787
Other	4	14	2,659	1,116	0	441	0	0	127	0	4,361
TOTAL: PRIMARY NUTRIENT FERTILIZERS	437,528	1,927,842	5,566,853	4,675,462	2,311,604	2,622,210	1,336,344	504,340	1,839,470	354,382	21,576,035
SECONDARY & TRACE NUTRIENT MATERIALS											
Aluminum sulfate 4/	4	8	7	0	0	0	0	0	53	0	72
Borax 3/	47	165	337	193	49	418	25	0	630	0	1,864
Calcium sulfate (gypsum)	101	3,238	99,307	1,717	135	2,132	810	39,008	742,252	2	888,702
Copper sulfate 4/	0	64	208	36	0	1	0	0	202	0	512
Iron sulfate 4/	0	0	105	0	0	0	15	549	2,308	2,311	5,288
Magnesium sulfate 3/	28	250	114	33	0	0	3	5	64	117	614
Manganese sulfate 3/	2	136	57	430	0	0	1	0	43	0	669
Mixed minerals 4/	0	19	1,097	15	266	7	102	651	3,864	0	6,021
Sulfur: 25-99% S	7	32	195	1	38	2	3,281	1,585	16,409	0	21,550
Sulfuric acid: 40-93%	0	0	0	0	0	0	734	2,674	964	0	4,472
Zinc sulfate 4/	0	27	216	1	4	85	3	3	3,254	66	3,659
Other	0	0	31	107	0	0	0	2,235	3,932	0	6,305
SECONDARY & TRACE NUTRIENT MATERIALS	189	3,939	101,674	2,533	492	2,645	5,075	46,710	773,975	2,496	939,728
GRAND TOTAL	437,717	1,931,781	5,668,527	4,677,995	2,312,096	2,624,855	1,341,419	551,050	2,613,445	356,878	22,515,763

1/ Including 1,030 tons of 30-10-0 grade, 6,100 tons of calcium metaphosphate, 4,625 tons of diammonium phosphate, and 297 tons superphosphate (48%) distributed by Government agencies for test demonstrations. Does not include liming materials or the quantities of materials used for the manufacture of the indicated quantities of commercial mixtures. The primary plant nutrient content of mixtures is shown in table , and of the principal materials in table . 2/ Consumption in Alaska was not available. It is estimated to be not more than 2,000 tons. Consumption in U. S. possessions considered negligible. 3/ Minor quantities may have been used for other purposes than fertilizer. 4/ Distributed by manufacturers of fertilizers. 5/ Including quantities reported as mixtures. 6/ Additional quantities may have been reported by grade under mixtures. 7/ Additional quantities are given free to farmers for which no records are kept.

Nearly two-thirds of the tonnage of mixed fertilizers was supplied by approximately 1% of the grades. As in the preceding year, the 5-10-10 grade was consumed in largest tonnage. The relative order of most of the next 14 grades was the same in 1957-58 as in 1956-57 except that 3-9-6 was replaced by 5-10-15 and the relative orders of 5-20-20 and 3-12-12 and of 4-10-7 and 2-12-12 were reversed.

The 5-10-10 and the 4-12-12 grades consumed in the largest tonnages for the individual grades have nutrient ratios of 1:2:2 and 1:3:3. Mixtures having these ratios were also in the largest total tonnages in 1957-58.

The national weighted average of the primary nutrients contained in mixtures in 1957-58 was higher than that of the previous year. Nitrogen was 5.96%; available P_2O_5 was 12.53% and K_2O, 11.73%. These add up to a total of 30.22%. The total last year was 29.53% nutrients. Nitrogen registered the greatest increase with 3.85% gain in 1957-58.

Fertilizer materials used separately in 1957-58, including secondary and trace element materials, amounted to 8,162,740 tons which comprised 36.3% of all fertilizers used. This figure compares with 35.3% for the preceding year. The quantity of these materials was 156,536 tons (2.0%) more than the 8,006,204 tons used in 1956-57.

Compared with the previous year, the chemical nitrogen materials and the natural organic materials were consumed in larger amounts while the use of phosphate, potash, and secondary trace nutrient materials decreased. The changes in consumption of chemical nitrogen, natural organics, and phosphate materials followed the general patterns of the past five years. The decreased consumption of potash materials was a reversal of the pattern.

The increase in the consumption of chemical nitrogen materials was due largely to the greater use of anhydrous ammonia, nitrogen solutions, and ammonium sulfate. The larger tonnages of these materials together with increases in ammonium nitrate and other chemical nitrogen products, more than offset the decreased tonnages of ammonium nitrate-limestone mixtures, sodium nitrate, and urea.

Consumption of the principal natural organic products (compost, dried manures, sewage sludges) was only a little higher in 1957-58 while the use of most of the other products in this category was generally lower than in the preceding year.

Consumption of primary plant nutrients presents an interesting statistic for 1957-58. The fertilizers used in this period contained a total of 6,512,387 tons of primary plant nutrients, which was 2.1% more than that consumed in the previous year. The use of these nutrients in 1957-58 was 2,284,359 tons of N; 2,292,890 tons of available P_2O_5 and 1,935,138 tons of K_2O.

Compared with the preceding year, nitrogen increased 7.0%, but decreases occurred in available P_2O_5 (0.5%) and K_2O (0.1%).

Although the tonnage of fertilizers containing these nutrients in 1957-58 was 0.9% less than 1956-57, the quantity of primary nutrients supplied was 2.1% more, according to the report.

Mixtures comprised 66.5% of the total tonnage of primary fertilizer nutrients and supplied 37.4% of the N, 78.4% of the available P_2O_5 and 87.0% of the K_2O.

Primary nutrient materials used for direct application comprised 33.5% of the total tonnage of fertilizers containing such nutrients. They accounted for 62.6% of the nitrogen, 21.6% of the available phosphate and

Turn to CONSUMPTION page 23

Safety Factors Involved in . . .

Mixing Pesticides and Fertilizers

By Loyd L. Stitt*
Velsicol Chemical Corp.
Chicago, Illinois

Mixtures of pesticides in plant food products have become accepted in a number of states, with resulting problems arising in manufacturing plants. Unusual precautions must be taken for protection of plant personnel in handling toxic materials, but the problems involved are not insurmountable. Here are some practical suggestions for the pesticide-fertilizer mixer to follow.

THE GROWING PRACTICE of mixing pesticides with fertilizers to meet demands of farmers who want such combinations, presents some unusual problems for the fertilizer plant manager responsible for smooth and safe production of these materials.

The safety factor is a pertinent one, since it involves a number of people in the plant and calls for special precautions not usually needed in the mixing of plant food ingredients alone. In view of this, it would be well to review some of the rules and other considerations associated with the packaging and labeling of pesticides.

Four categories of toxicity are listed for economic insecticides by the plant pest control branch of the Pesticide Regulation Section, U.S. Department of Agriculture. These four categories are as follows:

"Poison"

1. The most toxic is called "highly toxic" and requires the skull and crossbones and the word "Poison" (in red) on a contrasting background, along with an antidote statement which includes, "Call a Physician Immediately."

"Warning"

2. The second class below this highly toxic category includes materials having toxicities down to 1/10 those of the highly toxic. A warning statement is required, but it is not necessary that the label carry a skull and crossbones or the word "poison."

"Caution"

3. The third category embraces products having hazards below class 2, but requiring some cautions. The toxicity is about 1/10 of the class two. The precaution statement indicates the need of avoiding the principal hazards and the antidote statement is not necessary.

Mild Label

4. The fourth class is comparatively free from danger and no warning, caution or antidote is required on labels.

Materials currently most commonly used in insecticide-fertilizer mixtures will require a caution or warning statement on the fertilizer bag. Although the antidote statement is not required, it is usually on all labels as a precaution.

In the mixing of products the insecticide will be applied in either liquid or dry form. First, I would like to discuss the safety factors in the liquid application. The problems can be listed as:

1. **Solvent**
2. **Ventilation**
3. **Spraying**
4. **Personnel**

It is important to know the flash point of the solvent used in the insecticide formulated material. If the flash point (COC) is below 140° F., then explosion proof motors, switches, etc., are needed. Also, be extremely careful that no flames are used in the area if the high flash points are used. For solvents with flash points above 140° F. (COC), use the normal precautions suggested for handling solvents.

Ventilation is very important over the spray areas wherever the insecticide is applied to the fertilizer. One suggestion is the possibility of using a cover of closure over the spray area to confine the spray particles within this closure which can be vented to carry the spray mist away from the workers.

In spraying, certain procedures can be followed to reduce the spray mist which would disperse through the building or work area. A coarse spray should be used and adjustment as to numbers or orifice of the nozzle should be used to meet these requirements.

In the case of the finished product, the concentrate of the insecticide will be from ½ to 1%. No face protection of the handlers is necessary unless gross negligence occurs. For the personnel handling the concentrate, or one in the area of spray application, certain precautions should be followed.

The person handling the concentrate should wear neoprene gloves, rubber apron and a face shield or goggles. If an accident should occur and the skin or clothing becomes contaminated, a shower using soap and water should follow immediately. The contaminated clothing should be cleaned and fresh clothing used.

Smoking, chewing tobacco or snuff, eating food and similar practices should not be allowed in areas in the mixing plant. As a precaution measure, the individuals handling the concentrate should take showers daily at the plant before leaving.

In the case of the dry formulations, either the granular or dusts, certain precautions to reduce inhalation are very important. The personnel that would be in continuous contact with the dust should use respirators to prevent the inhalation of the dust particles. Precautions given for the liquid application can be followed also for the dry application. The only difference is that the problem of contact is not as serious with the dry formulations.

As to the labeling of insecticide-fertilizer mixtures, they very often will depend upon state regulations. Our company has a federal label for the combination of heptachlor with fertilizer for the control of corn rootworms. In this label, you will declare the active ingredient which for ½% material will be as follows:

Active Ingredients	
Heptachlor	0.5 %
Related Compounds .	0.19%
Inert Ingredients	99.31%
	100.00%

In this case, the inert ingredient will be the fertilizer. The guaranteed analysis given the NPK will be the same as on normal fertilizer brands. According to the information we have, the source of the NPK will need to be shown on the label. Some states may vary as to these requirements.

Rodney C. Berry, director, division of chemistry, Richmond, Va., has made a survey of the various states asking about the requirements of labeling for fertilizer pesticide mixtures used on field crops. Since his latest survey was completed in 1955, there have been some changes made since that time, but a summary of the requirements by states indicates that, in most cases, the mixture has to be registered under both the insecticide and fertilizer law.

With the inclusion of insecticides in fertilizer mixtures, good housekeeping should be followed. To show the importance of good housekeeping as a factor in safety, I would like to refer to some of the procedures carried on at our plant. In the health and safety procedures for the production of heptachlor, we find this part in the precautions:

"Plant cleanliness and good housekeeping practices are essential to safe handling of the material."

Many millions of pounds of insecticides have been manufactured and packaged by the industry during past years, and by paying attention to good housekeeping practices and employing adequate safety measures, no serious hazards have occurred.

The fertilizer industry, also, can handle insecticides for use in fertilizer mixes without undue hazard by these same good housekeeping practices.

There is no need for harm to workers if sensible safety precautions are observed.

*From paper presented at safety training school, Chicago, Aug. 19, 1959.

Extra-Tough Polyethylene Developed by Chippewa Plastics for Moisture-Proof Bags

Chippewa Plastics Co. has announced the development of a new extra-tough polyethylene film for making its industrial bag. The new development, the company says, permits a 40% reduction in the gauge of the material for its heavy-duty bag. The new bag is expected to be used for shipping and storing ammonium nitrate fertilizers and other agricultural products with complete protection from moisture.

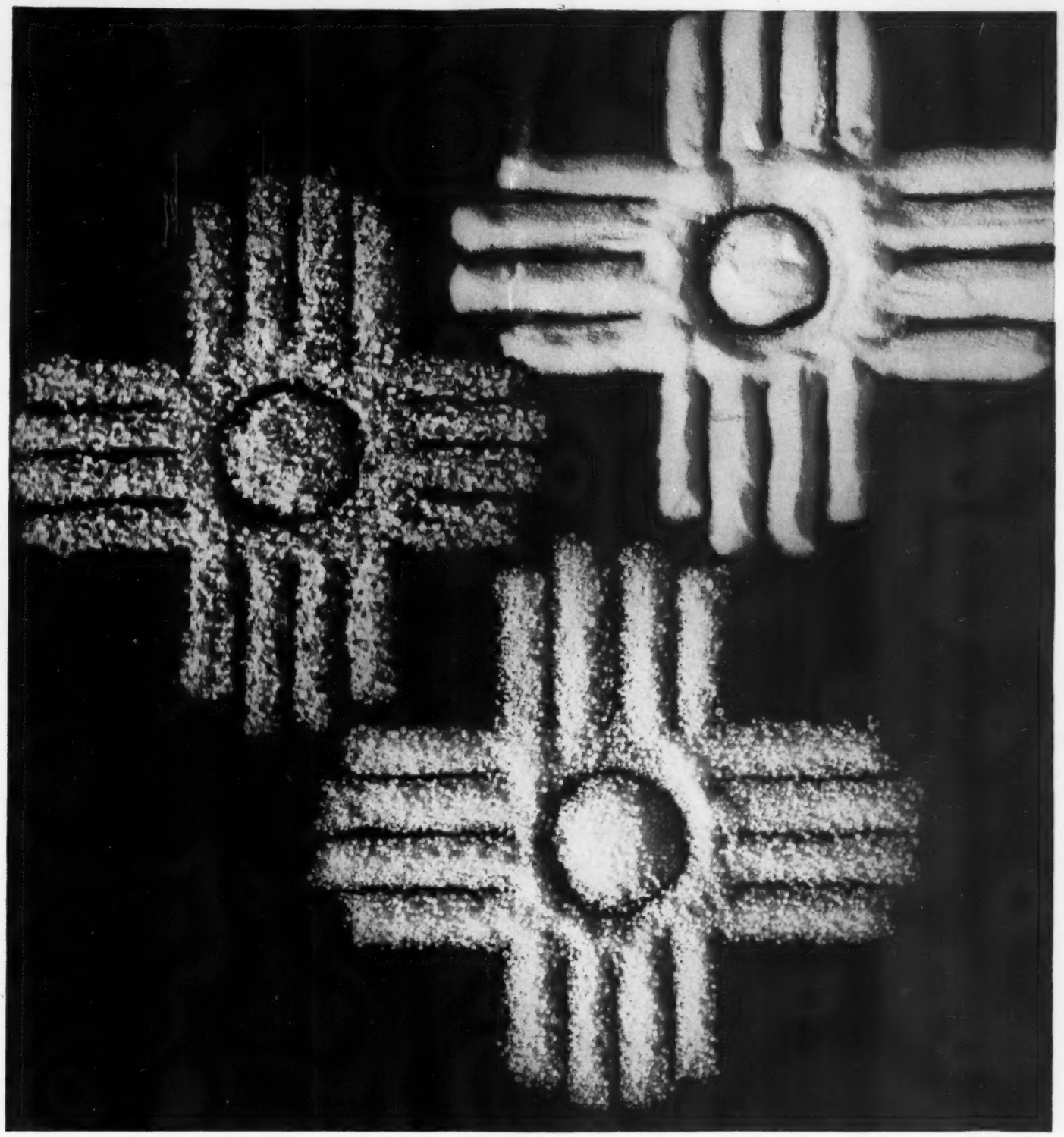
Presently identified as the "Type B Chippewa Industrial Bag," the new bag appears to have improved puncture and snag resistance despite its thinner walls, company researchers say. It also features the recently-developed "Chipp-a-Weld" seal which the maker says equals the strength of the bag itself.

Chippewa Plastics pioneered the original 10-mil polyethylene bag, introducing it in 1958. It has been widely used for packaging products including chemicals and fertilizers.

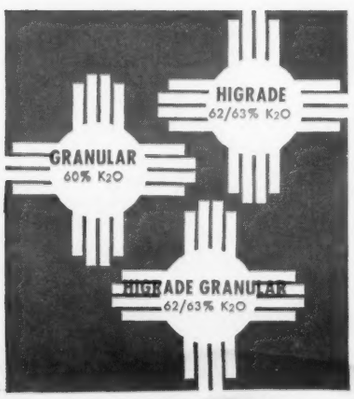
In its early stages, the polyethylene bag cost more than multiwall paper bags, but Chippewa Plastics states that the reduction in gauge will permit an appreciable reduction in bag cost for the new Type B Industrial bag.

In addition to its present applications, the new bag is expected by its maker to have wide use in bagging a variety of items requiring a positive moisture barrier.

While field tests are in progress, the new "Type B" bag is available in limited quantity to prospective users for experimental purposes, the company said.



Better fertilizers begin with three top quality grades of USP potash



For the manufacture of all modern fertilizers, USP offers *three* outstanding grades of potash: two white grades—Higrade muriate and Higrade Granular muriate—each containing 62/63% K_2O, and each specially sized to meet current fertilizer manufacturing requirements. These white muriates give you the most potash per ton for mixed fertilizers. And USP's Granular muriate, containing 60% K_2O, is ideally suited for fertilizer uses requiring a still larger particle size. All three grades resist caking and remain free-flowing for easy storing and handling.

For complete technical data and shipping information, contact the United States Potash Company. Our expertly staffed Technical Service Department welcomes your inquiries.

UNITED STATES POTASH COMPANY
DIVISION OF UNITED STATES BORAX & CHEMICAL CORPORATION
50 Rockefeller Plaza, New York 20, New York
Southern Sales Office: Rhodes-Haverty Building, Atlanta, Georgia

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MEMBER: AMERICAN POTASH INSTITUTE

REG. U.S. PAT. OFF.

ON THE RIGHT TRACK . . .

Old Roundhouse Plant Provides

MANAGEMENT—Alf H. Oines (right), president and secretary, and Robert W. Freske, vice president and treasurer, of Michiana Chemical Co., at their desks at Niles, Mich.

FAR-SIGHTED IMAGINATION was exhibited on the part of the owners of Michiana Chemical Co., Niles, Mich. when they visualized the possibilities of converting an abandoned railroad roundhouse for use as a fertilizer manufacturing plant. Today the success story of the company in its semi-circular quarters is eloquent testimony to the wisdom of the move.

Alf H. Oines, president, and Robert W. Freske, vice president, report that the plant, despite some rather awkward situations due to its unorthodox shape, has been adapted quite well to the manufacture of high-analysis fertilizers for distribution within a radius of about one hundred miles.

Some of the plus factors, the operators have found, lie in the built-in rail facilities which enable hopper cars and tank cars to be brought directly inside the plant for unloading. An old turntable in the plant's front yard is still operable and serves to head the cars onto the proper track for spotting within the structure.

Possibly no other fertilizer plant in the world has office rooms as numerous as the Michiana firm. It has taken over an old 41-room hotel formerly operated by the railroad and changed it into an efficient headquarters for the fertilizer manufacturing company. The building has complete toilet, locker room and shower facilities for the plant and office personnel, as well as a snack bar for employees, truckers and customers. There is also ample space for soil-testing laboratories and an auditorium for dealer, farmer and educational meetings.

As noted in the photos, charts on the wall simplify keeping up with rail shipments of raw materials into the plant as well as shipments both by truck and rail out of the plant with bulk or bagged goods. An outline chart of the storage bins in the building also hangs on the wall within easy sight and easy reach of the office people, so there is not likely to be misunderstanding about where the various raw and finished materials are located.

As mentioned previously, one of the handiest features of having the fertilizer manufacturing facilities located in the roundhouse, is the fact that railway cars may be brought right inside the structure for unloading. As noted in the cover picture in this issue, hopper cars are unloaded inside the building through a track screw into the elevator and discharged to another section of the building.

Close scrutiny of the front page picture shows the entire mixing and bulk loading mill. The top level has the holding hoppers, three liquid measuring tanks and scale hopper. On the middle level is the one-ton mixer and the bulk loading chute.

Finished products are elevated into the holding hoppers, then weighed out in the batching hopper and discharged into trucks through the tube on the second level.

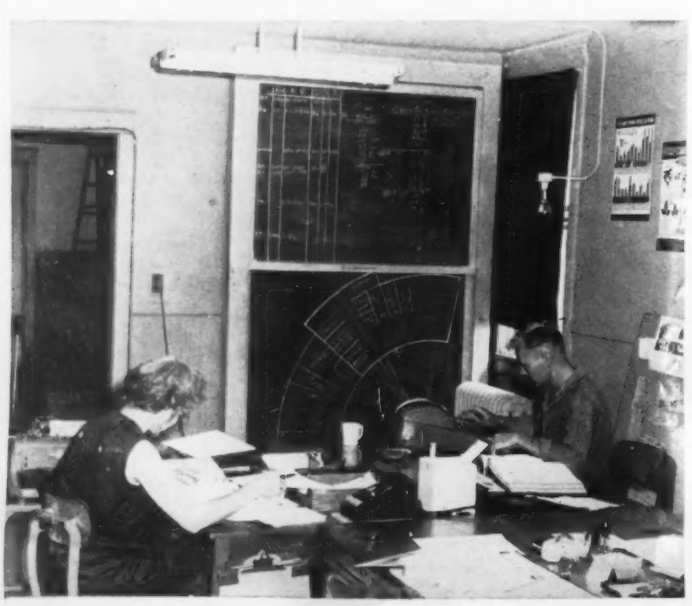
On the floor level is the electrical control panel, the shroud for the cooler, and the 10,000 cu. ft. per minute exhaust fan which discharges into a 24-inch stack.

Most of the mechanical devices within the plant were custom-made, of necessity, because of the circular shape of the building. "Our main difficulty during plant construction was trying to put straight equipment into a round building," explains Mr. Freske. He adds that most of these problems were overcome and the manufacturing and storage facilities now occupy about 40,000 of the total 60,000 square feet of the former railroad facility.

Mr. Freske comments further on how the firm managed to get under way. "The entire installation is practically self-designed and homemade," he says. All parts, equipment and steel were second hand, he observes, but new motors were installed. Technical assistance was furnished by several raw material suppliers, and the plant was designed to move approximately 20,000 tons of mixed fertilizers. The elevator alone, he says, will handle 45 tons of material an hour.

T. J. Nickolas, plant superintendent, was responsible for supervising and participating in most of the construction and erection of equipment in the plant. This type of job continues even though the plant is now producing heavily. Additional equipment is still being installed.

Storage bins take on an unusual appearance in the Michiana plant, since the dividers are constructed of old railroad ties. Possibly forming one of the most rugged partitions in the industry, these bins

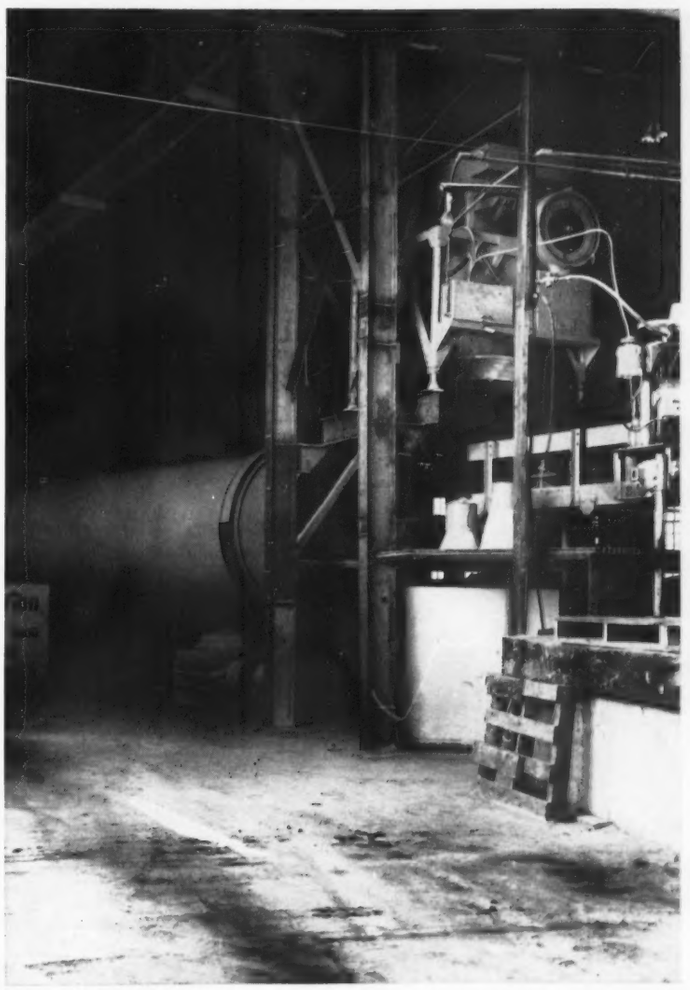


Made into Fertilizer Splendid Facilities

store hundreds of tons of raw materials and finished goods. In fact, according to Mr. Freske, the semi-circular shape of the building presented an ideal layout for bulkhead construction.

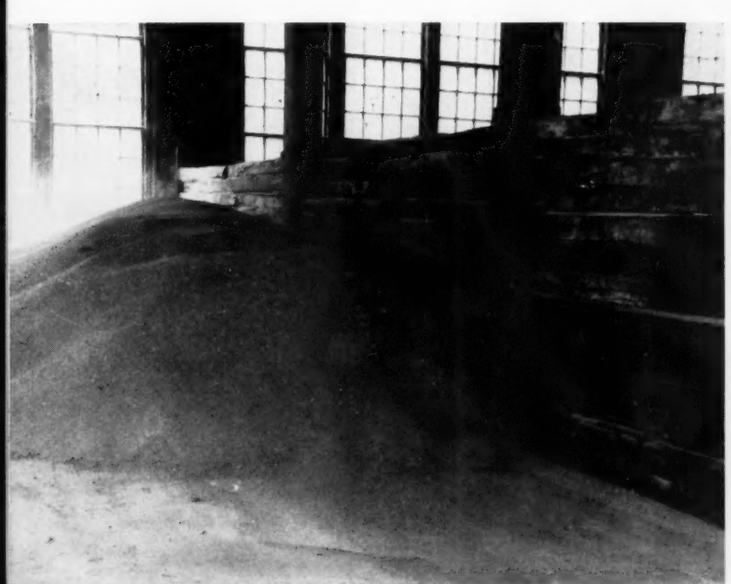
The plant is arranged so the production work may be accomplished by a minimum of help. In addition to the two officers at the head of the company, two men, one operator and one tractor driver, handle the mixing. The shipping mill consists of a tractor driver, one man on the bulk mill, a dropper and sewer on the bagging mill, and two stackers.

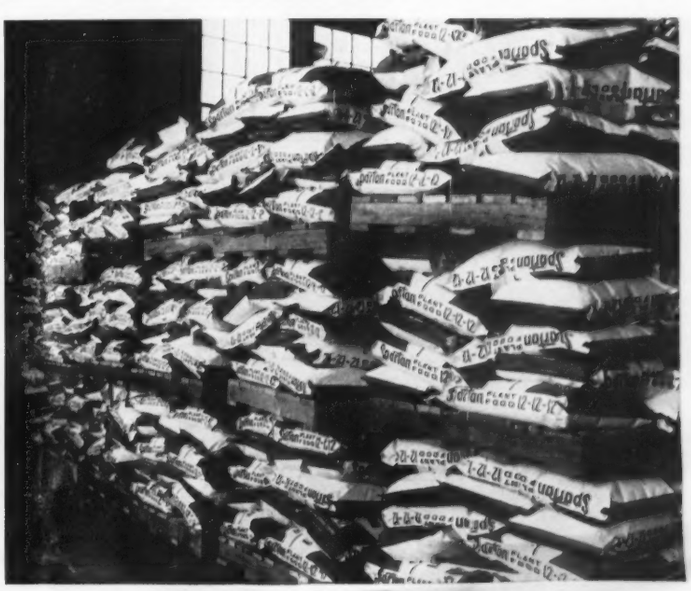
Since only one elevator is used for four operations, mixing is done at night with a two-man crew.



MICHIGAN PLANT SCENES—Photos on these two pages show some of the key people and production equipment of Michiana Chemical Co., Niles, Mich. Above, right, is T. J. Nickolas, plant supervisor, who has 15 years' fertilizer experience. At right is part of 6′ x 35′ rotary cooler and advancing flights which discharge into a conveyor in foreground, thus bringing material to bagging hopper. Both 80-lb. and 50-lb. bags are packed. The bulk hopper on floor at left, catches any spilled product so it may be returned to system and avoid shrinkage.

Across bottom of pages 6 and 7: Shipping and accounting department under direction of Mrs. B. Demuth, assisted by Bob Green. Blackboard on wall is diagram of plant and shows where materials or analyses are located. Daily car numbers are also kept on board, with dates shipped and received. Next photo shows closeup of converted roundhouse plant. Turntable is in foreground, and two doors on right are truck-loading dock. Open door at left is mixing mill and bulk loading mill. (The two hoppers at right front were being installed inside the building for bulk plant food loading.) Elevator at top is 91 ft. tall. Below is raw material bin containing triple superphosphate. Bulkheads of all bins are constructed from railroad ties pinned together with $\frac{5}{8}$" rod. Finished product bulkheads are similarly constructed. Total bulk storage space in entire plant is about 4,500 tons. Right, below: All products in the bag warehouse are palletized. The bag warehouse during the peak season can hold approximately 300 tons of bagged goods.





Miller Products Expands Pesticide Plant Facilities by Purchase of New Building

PORTLAND, ORE. — Miller Products Co., one of the Northwest's oldest agricultural chemical manufacturers, has announced the purchase of the 60,000 square foot concrete and steel building and a 5½ acre site in Portland as part of its expansion program which will treble the firm's manufacturing space.

Roy E. Miller, president, said that the move from their present location in Portland and remodeling of the new building for office, warehouse and small packaging use would get under way immediately and is expected to be completed by the first of the year. A separate formulation building 120 x 200 feet will also be constructed on the site.

"We are planning to install the latest bulk and small packaging equipment and automated handling facilities in order to stay in the forefront on new methods and to keep completely competitive," Mr. Miller stated. "We are looking forward to continued growth and development of a broader marketing area for our farm and garden chemical products. A new phase of the company's operation will be complete Aerosol formulating and packaging facilities."

A total of more than $500,000 will be invested in the new location, according to Mr. Miller, and when completed will provide one of the most modern agricultural chemical manufacturing facilities in the West. Rail connections on the mainline of the Union Pacific Railway and easy access to highways and freeways will expedite shipments to all of their dealer organizations.

NEW FACILITIES—Miller Products Co., Portland, Ore., has announced an expansion program to treble its manufacturing space for making pesticides. Drawing above pictures new plant facilities as they will appear when program is completed. The Miller firm is one of the Northwest's oldest agricultural chemical manufacturers, with over 160 agricultural products being produced by the company.

The firm, which will celebrate its 40th anniversary next year, was started in 1920 by Mr. Miller when he was a county agent at Grants Pass, Ore. His first market product was a commercial spray spreader. This led to manufacturing the sprays and later to wood preservatives.

The company moved to Portland in 1922 when it was incorporated. The original factory outgrew its old location and both plant and office were moved to their present site in 1926.

Today, the firm employs 40 people the year around and during peak seasons, 100 men and women. Over 160 agricultural products are manufactured, including insecticides, fungicides, plant hormones, weed killers, fertilizers, fumigants, wood preservatives and soil correctives. In addition, the firm has complete facilities for bulk formulation for the farm trade. They are also sales agents for basic chemical companies and do a large volume of custom formulating.

Sales are handled through recognized agricultural dealers, and farm and garden jobbers and distributors. The trade territory covered by Miller's comprises Oregon, Idaho, Washington, Utah, Northern California and Western Montana. The company has a growing export business for agricultural chemicals and has shipped to Canada, South Africa, Australia, New Zealand and Palestine.

In addition to Mr. Miller, other company officials are: Frank B. Stewart, general manager and executive vice president; Robert W. Moen, assistant general manager and vice president in charge of research; Keith Sime, vice president in charge of sales; A. J. (Jim) Overton, assistant sales managers. Others on the staff

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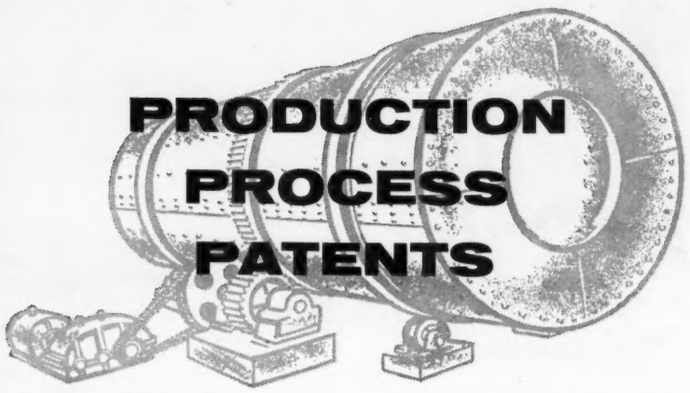
Roy E. Miller



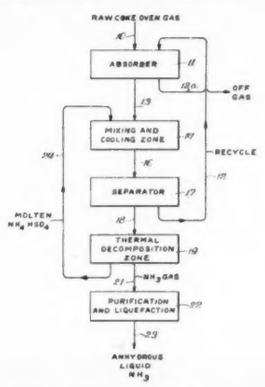
PRODUCTION PROCESS PATENTS

2,899,271

Process for the Manufacture of Phosphatic Fertilizers. Patent issued Aug. 11, 1959, to Robert Miche, Chatou, France, assignor to Comptoir des Phosphate de l'Afrique du Nord, Paris, France. In a process for the manufacture of dicalcium phosphate from natural phosphate in which the natural phosphate is treated with a cold aqueous solution of SO_2 under pressure, followed by separation of the resulting phosphate solution from insoluble material, the improvement which comprises adding dicalcium phosphate to the phosphate solution in an amount sufficient to raise the P_2O_5/CaO ratio in the phosphate solution to a value equal to that of dicalcium phosphate, about 1.27, by the precipitation of calcium sulphite from the solution, separating the precipitated calcium sulphite from the solution, heating the solution to liberate SO_2 and thereby to precipitate dicalcium phosphate and recovering the precipitated dicalcium phosphate.

2,899,277

Recovery of Ammonia from Coke Oven Gas. Patent issued Aug. 11, 1959, to Michael O. Holowaty, Gary, Ind., assignor to Inland Steel Co., Chicago. In the process of recovering ammonia from an ammonia-containing gas including the steps of reacting said gas with aqueous ammonium bisulfate liquor in a reaction zone to form ammonium sulfate, effecting separation of ammonium sulfate from said liquor, recycling said liquor to the reaction zone, thermally decomposing said ammonium sulfate in a decomposition zone to form ammonia and ammonium



bisulfate, recovering said ammonia, and returning said ammonium bisulfate for reuse in said reaction zone; the improvement which comprises withdrawing from said reaction zone a slurry of ammonium sulfate crystals in said liquor, and commingling molten ammonium bisulfate from said decomposition zone with said slurry prior to said separation whereby to effect precipitation of additional ammonium sulfate crystals from said liquor and whereby to dissolve the ammonium bisulfate in said liquor for return to the reaction zone.

2,899,293

Method of Producing a Nitrogen Phosphate or Potassium Nitrogen Phosphate Fertilizer. Patent issued Aug. 11, 1959, to Eiji Minekate, Tsunetomi, Nobeoka-shi, Japan, assignor to the Asahi Chemical Industry Co., Ltd., Osaka, Japan. A method of producing a nitrogen phosphate fertilizer, which comprises completely dissolving rock phosphate in nitric acid, ammoniating the solution to produce an aqueous suspension consisting essentially of dicalcium phosphate, ammonium nitrate, calcium nitrate and from 20-40% water, concentrating the suspension to a slurry containing from 5-15% water and charging carbon dioxide and ammonia gas under pressure into the concentrated slurry.

2,899,347

Method of Making Bag Closure. Patent issued Aug. 11, 1959, to Harold V. Kindseth, Minneapolis, Minn., assignor to Bemis Bro. Bag Co., Minneapolis. A method of providing a unitary bag closure which comprises punching a row of spaced apart perforations in at least one cut end of a tubular bag blank adjacent to the end edge thereof, continuously extruding a strip of hot softened thermoplastic resinous material to opposite sides of said perforated bag end over the perforations, pressing said thermoplastic resinous material through said perforations while said strip is in a heat softened condition to bond the resinous material to itself and thereafter trimming the ends of said strip beyond the side edges of the bag.

2,899,446

Improvement in the Process of Preparing Endrin from Isodrin. Patent issued Aug. 11, 1959, to Daniel R. Marks, Memphis, Tenn., assignor to Velsicol Chemical Corp., Chicago. In the process for preparing endrin from isodrin by epoxidizing isodrin with an organic per-acid, the improvement which comprises conducting said epoxidation reaction in a reaction mixture containing dipicolinic acid.

2,897,053

Wet Process for Phosphoric Acid Manufacture. Patent issued July 28, 1959, to Hans Svanoe, Warren, Pa., assignor to Struther Wells Corp., Warren, Pa., a corporation of Maryland. In a process for the preparation of phosphoric acid from phosphate containing rock and sulfuric acid the steps which comprise reacting phos-

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Responsibilities of Plant's Foremen Include Instructing Employees to Abide by Rules

By John E. Smith*
Director of Safety
Spencer Chemical Company
Pittsburg, Kansas

THE PURPOSE of all safety effort is, first and foremost, to prevent accidental injury or death to human beings. When a company hires a man, it accepts responsibility for his safety on the job. This obligation is in turn placed on the shoulders of the supervisor whose efforts to prevent his men from getting hurt should be as important as meeting production and quality standards.

In addition to human suffering, accidents cost money. The worker loses wages and the company loses production and has to pay compensation costs.

Thus safety pays off, too. The supervisor who enjoys an accident-free record usually has the confidence of his workers and gets good production and quality results. The reason for this is that people work best when they don't have to worry about getting hurt.

When a foreman or supervisor goes all out for safety, he enjoys the personal satisfaction of knowing that he is helping to prevent suffering and hardship. Workers sense his genuine interest in them and they will tend to cooperate to make a good safety record.

Work injuries are of two types:

1. Those which occur due to an unsafe condition, method or process. Examples are those which occur when gears are improperly guarded, passageways or stairs are poorly lighted, or housekeeping is sloppy.
2. Those which are the result of unsafe acts on the part of workers. Examples are accidents caused by horseplay, running in the department, cleaning a machine while it is running, or failure to wear the required protective equipment.

Accidents that arise out of unsafe conditions, methods or processes are the easiest for the foreman to correct. You can usually eliminate the causes by making simple mechanical improvements. Keep your eyes open as you go about your department and you will be able to spot these hazards before they cause trouble.

Accidents resulting from unsafe acts on the part of workers account for more than 80% of all industrial injuries. Preventing them is more difficult since there is no simple mechanical remedy. Eliminating these accidents depends upon the knowledge of the worker himself. The foreman should get to know the worker who is absent-minded, the worker who likes practical jokes and the worker who is always in a hurry or impulsive. They are the weak links in the safety chain. A little extra attention will go far toward eliminating their shortcomings. If possible, find out why they act as they do, and then do what you can to correct their unsafe habits or practices.

It is good to remember that a man who works safely usually works well. Here are some tips on how to get the job done safely:

1. Start a new worker off on the right foot. Know the safety angles of the job and train the new man to do the job safely.
2. Make safety training a part of regular job training.
3. Make it a habit to include safety in all job instructions. It is part of the job.
4. Proper habits have a lot to do with working safely. Aim to develop safe working habits. Then keep checking to make sure they stick.
5. When giving safety instructions, always explain why. "You see, Bill, if the pressure goes over that mark, a pipe may burst." "This square shaft end looks harmless, but you can get a mean bruise by touching it when it's turning, so let's be sure to keep that guard in place."

Don't take it for granted that a man knows why a job must be done in a certain way. Tell him, so that he will know what the dangers are.

Safety rules are the guide-posts to accident-free work. Here are some of the things a foreman should do:

1. Emphasize that safety rules are not made to make work harder; that their purpose is to prevent injuries.
2. Be sure the workers understand exactly what each rule means. Explain any technical terms, especially to a new man. Actual-

*From paper presented before Midwest Regional Fertilizer Safety School, Chicago, Aug. 18, 1959.

ly show the equipment, operation, or machine to which the rule refers.

3. Put yourself in the worker's place when explaining the reasons for safety rules. Think of all the things you would like to know, and be careful to explain the why of every safety rule.
4. Merely ordering people to observe safety rules, instead of explaining the how and why, may lead workers to try dangerous experiments when the foreman's back is turned.
5. When a worker is fully aware of the hazards, he will understand better why it is necessary to have safety rules.
6. Explain why the violation of a safety rule is considered just as serious as the violation of any other company policy or regulation: that it may injure other workers, cause a loss of time, or destroy company or personal property.
7. Workers appreciate your explanation because it shows that you respect them as intelligent human beings.

An infection that develops from the neglect of a minor injury is as much an accident as a finger caught in gears. The foreman must insist that all injuries, no matter how slight, be reported. Explain that this is to prevent possible infection.

Simply giving orders to report all injuries is not enough. Workers must be sold on the importance of first aid for all injuries. More than one arm has been lost through a neglected pinprick and subsequent infection.

Never permit a worker to shrug off a minor cut and return to his work without first aid. Show a sincere interest in the injured worker. The main thing is what happens to him.

Keep a close check on every injury until it is completely healed. Do not rely upon workers to keep you posted on the progress of an injury. Look for

WORKING SAFELY...

yourself, or check with the person administering first aid, and consider every minor injury as potentially serious and decide how to eliminate the cause.

Foremen or supervisors are responsible for preventing accidents. Workers, however, should be even more interested in safety because it is they who suffer when an injury occurs. Therefore, workers should be encouraged to take part in accident prevention work whenever possible. For example, they may have suggestions on how to improve safety rules. Or, they may want to paint lines to mark aisles, design a safety poster or clean up a hazardous condition in the department. There is nothing like having a part in preventing accidents to bring home the importance of safety.

Workers who help formulate safety rules are much more inclined to observe them than workers who do not. A new operation in the department provides a good chance to get the help of the workers in drawing up safety rules to cover it. Arrange regular meetings with workers to discuss safety problems. When such meetings are held, be sure safety is the only topic for discussion.

Formation of a safety committee is one very good way to get workers to participate. Be sure the duties of such a committee are clear. Rotate membership so that everyone has an opportunity to serve. However, unless special authorization is given, do not permit any worker to issue safety instructions or give orders pertaining to safety. This must remain the responsibility of the foremen or the supervisor.

Always give workers the satisfaction of an answer to their suggestions and recommendations. If a suggestion or recommendation is accepted, acknowledge it and tell the worker when it will be put into effect. When the suggestion is not practical, thank the worker for his thoughtfulness and explain why his idea cannot be carried out.

Workers find out quickly whether or not you have a real interest in safety, so do not expect them to have a better attitude toward safety than you have yourself.

Your actions have great influence upon the safety-mindedness of your workers. One violation of a safety rule by you may offset weeks of effort on your part to build-up respect for safety. Workers are far more willing to observe safety rules when they see that their foremen or supervisors also observe them.

Never permit an exception to a safety rule in order to get a special job done quickly. Workers may get the idea that they do not have to observe safety rules when it is inconvenient to do so.

Obviously, the supervisor must know the safety rules for his department thoroughly if he is to set a good example.

Turn to **FOREMEN** page 20

Here's How to Get Most Out of Your Control Devices

Failure to recognize and correct early trouble symptoms can become expensive

By H. A. Wright

MOST electrical control devices, be it a motor starter, switch or integral control, will give trouble-free service provided they are properly applied, have an adequate electrical system and are correctly maintained.

Since most control devices have moving parts, failure to recognize and correct early trouble symptoms can lead to a chain reaction which could result in disproportionate maintenance costs or in complete replacement.

Only skilled personnel familiar with electrical equipment and the hazards involved should be permitted to service control units. All safety precautions should be observed, not only on the electrical equipment but on the driven machines as well. A periodic inspection schedule and preventive maintenance program will result in savings in replacement parts and down time of machines.

EDITOR'S NOTE: Mr. Wright is supervisory engineer of general purpose starters in the control department of Allis-Chalmers Mfg. Co.

Dust, dirt and grease should be removed periodically from the controller. Dust can cause mechanical failure and it may form a path between points of different potential, resulting in a short circuit. Dry dust can be blown off; sticky dust and grease are best removed with commercial solvent. Care should be taken when using solvents so the coils do not become soaked. Special attention also must be paid to rust and corrosion, particularly on thermal overload relays.

Moving mechanical parts should be free from excess friction. The parts should be tried by hand to locate any loose pins, bolts, etc. Wearing parts should also be checked for excessive wear. The bearings on electrical control equipment are designed to operate without lubrication. If oiled or greased, dirt will accumulate and cause sluggish action and possible failure.

Overheated parts are always a sign of trouble. Since various parts operate at different temperatures, it may be difficult to locate this trouble. For example, coils, blow-out coils, and other parts of the contactor may operate at a temperature which would boil water, hence these parts cannot be touched. Any evidence of baking or smoking, however, should be cause of immediate attention.

Loose connections, always a source of trouble, may develop at any time. Therefore, control connections should be checked periodically along with the main line connections.

The best way to check for grounds which may develop is to megger the cables and conduits periodically. This is especially necessary if water could collect in the conduit.

Contactors need the most care. Their bearings should be checked for free operation but not lubricated. Deposits on contacts should be removed with either sand paper or a fine file. Never use emery paper because it imbeds in the contact face and continues to wear. In filing, care should be taken to maintain the original shape of the contact, but do not overdo. While copper oxide should be removed because it is an insulator, trying to keep them smooth only wastes the material of the contact surface. Silver contacts should never be filed unless they become severely roughened. Silver oxide is a good conductor and does not need to be removed. When contacts are deeply pitted, burned or worn thin, they should be replaced in sets with new ones. Screws holding the contacts in place should be kept tight at all times.

Springs maintain the proper contact pressure. If contacts are permitted to wear too thin, spring pressure decreases and overheating results. This generally causes the spring to lose its temper, further decreasing the contact pressure. Spring tension should be checked with a scale in accordance with the manufacturer's recommendation. If a scale is not available, a comparison test could be made between the installed spring and a new one of the same design. Where neither of these tests is possible, springs may be checked by compressing with the fingers to determine whether one is weaker than the others. A good rule to follow is to replace contact springs when replacing contacts.

Coil Failure

New methods of impregnation have greatly reduced coil burn-outs. However, in the event of A.C. coil failure, the contactor should be checked for mechanical binding or blocking. For example, an A.C. contactor coil may have a 47 ampere inrush valve with the magnet open, and 1.7 amperes with the magnet closed in the sealed position. If the magnet is accidentally blocked open, or the voltage is so low that the magnet cannot seal against the contact springs, the current will be high, causing a burn-out.

Connectors made of fine stranded wire are subject to repeated flexing. Eventually some of the strands may break and the current increased on the remaining strands. In such instances the lead should be replaced. New leads should be formed by hand so they will take the flexing over

Turn to **CONTROLS** page 20

PREVENTIVE MAINTENANCE CHECK LIST

Date ..... Tool No. ..... Voltage .....

Serial No. ..... Hp ..... Location .....

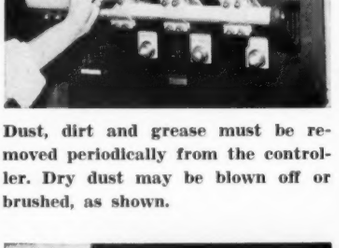
Pull disconnect switch before working on control

Check	Item	Operation
☐	**Dust**	Clean.
☐	**Rust and Corrosion**	Clean—Report if excessive.
☐	**Connections**	Tighten electrical connections, look for discoloration of any copper current carrying parts.
☐	**Nuts and Bolts**	Check mechanical connections.
☐	**Fuse clips**	Check for spring clip pressure.
☐	**Fuse ferrules**	If copper, polish; loose ferrules and proper size fuses.
☐	**Contact tips**	Look for copper oxide scale, dress only if necessary. Check roll and wipe.
☐	**Contact pressure**	Check contact pressure, is pressure same on all tips.
☐	**Flexible leads**	Look for frayed and broken strands, flexing over entire length.
☐	**Bearings**	Do not oil; are they free moving.
☐	**Coils**	Check for any signs of overheating or mechanical injury.
☐	**Magnets**	Clean faces, check shading coil, misalignment, mechanical binding, striking coil.
☐	**Overload relays**	Trip by hand, mechanically free, clean, check heater coil and tighten all connections.
☐	**Arc shields**	Check for breaks and burning.
☐	**Blowout coils**	Check for overheating and tighten.
☐	**Dash pots**	Free; clean, if oil type, check oil level.
☐	**Push Button or selector switch**	Clean, check contacts.
☐	**Relays**	Clean and check for mechanical binding and sticking. Check contacts.
☐	**Resistors**	Check for signs of overheating; if sliders tighten.
☐	**Oil Immersed Devices**	Drain small quantity from bottom to remove sludge; if much sludge, drain oil and clean. Check level and add; replace oil if black and dirty; check contactor and wipe off carbon.
☐	**Drum Controllers**	Tighten and check for contact wear and overheating; put small amount of vaseline on sliding surfaces.
☐	**Pilot Devices**	Clean and check contacts.

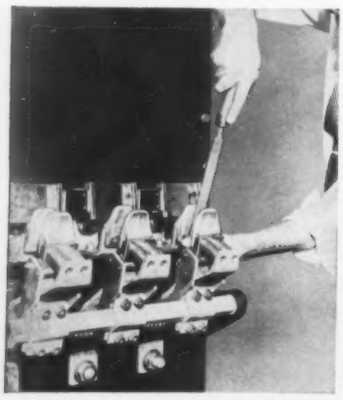
START THE MOTOR OBSERVING ALL SAFETY PRECAUTIONS FOR DRIVEN MACHINES.

☐	**Check starting sequence**	Does the control function properly.
☐	**Contactors**	Flash on closing, if so, check for adjustment to eliminate contact bounce.
☐	**Noise**	Check shading coils, magnet surface, sealing, mechanical binding, loose rivets.
☐	**Pilot Devices, Pressure Switches Temp. Switches**	Check bottom and top limits of operation. Is there any fluttering of contacts denoted by pumping of main contacts.

List any parts which will have to be replaced in the near future.

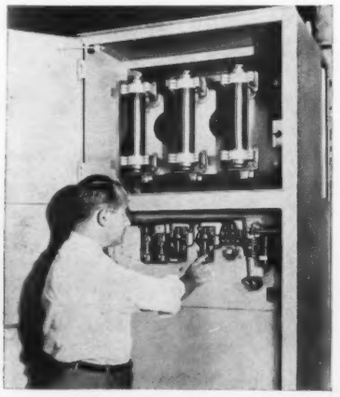


Dust, dirt and grease must be removed periodically from the controller. Dry dust may be blown off or brushed, as shown.

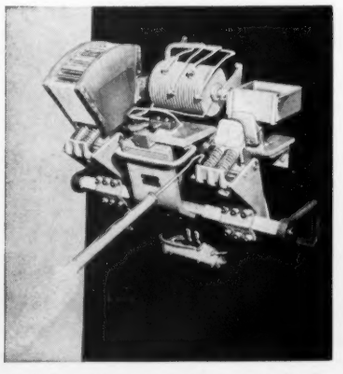


Although pitting of contacts does not affect their operation, deposits must be removed. When dressing contact tips, the original contact shape must be retained.

If water, sludging or excess carbon is present in high-voltage, oil-immersed contactors, new oil should be used. Check contact tips when inspecting oil for presence of carbon, etc.



Thermal overload relays should be reset or maintained only by experienced electrical service men to insure safe and efficient performance in the manufacturing plant.



Initial spring tension should be checked with a scale in accordance with the manufacturer's recommendation. Final contact pressure should be checked at contact heel in a similar manner except with the magnet in the closed position.

Arcadian® News

Volume 4 | For Manufacturers of Mixed Fertilizers | Number 8

HERE ARE 12 WAYS THE PRE-REACTOR PAYS!

MAJOR ADVANTAGES OF NEW TECHNIQUE

The new pre-reactor process for producing high-analysis, high-nitrogen mixed fertilizers is rapidly gaining in popularity because it offers so many outstanding advantages. Here are only a few of the many benefits fertilizer manufacturers obtain by incorporating a pre-reactor in a normal high-analysis manufacturing operation:

1 Low-cost Nitrogen

Produce such grades as 16-8-8, 16-4-8, 15-10-10, 12-12-12, and 14-0-14 with *all* the nitrogen derived at low cost from ARCADIAN® Nitrogen Solutions.

2 Accurate Formulation

Put exactly enough nitrogen into high-analysis fertilizers to meet minimum guarantees, without resorting to excessive formulation.

3 Less Loss of Nitrogen

Manufacture high-quality granular fertilizers with a recovery of 97 to 98% of nitrogen input.

4 Efficient Use of Acids

Neutralize ammoniating solutions with sulfuric acid, without using the excess amounts of acid often needed in conventional equipment. Provide more intimate contact of phosphoric acid with ammoniating solution.

5 Better Ammoniation

Get high ammoniation rates by ammoniating dry superphosphate before combining with nitrogen slurry from pre-reactor.

6 Savings in Handling

Eliminate costs of handling dry materials and unavoidable losses of these materials in manufacturing fertilizers.

7 Greater Precision

Gain efficiency and safety by precision control even at maximum ammoniation rates. Maintain effluent at the temperature, physical condition and moisture content desired for best results.

8 Improved Performance

Produce low-moisture, quality-controlled slurry that mixes easily with other fertilizer ingredients for better granulation and reduced re-cycle.

9 Fuel Savings

Use chemical heat of pre-reactor to produce hot, relatively dry slurry, reducing the need for fuel for further moisture reduction of mixed goods in dryer.

10 Fume and Dust Reduction

Minimize the expensive and wasteful nuisance of fumes and dusts usually encountered with conventional systems.

(Continued on next page)

(Continued from preceding page)

11 Simplified Solution Selection

Select and use only one ARCADIAN® Nitrogen Solution for year-round production of a great variety of fertilizer analyses.

12 More Space for Mixed Goods

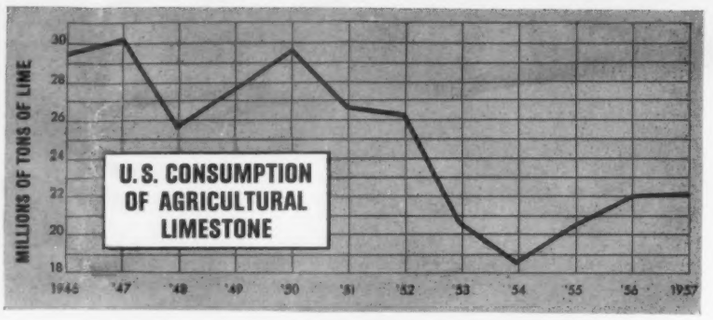
Use storage space for mixed goods rather than solid nitrogen materials. No storage space is needed for solid nitrogen for manufacturing mixed fertilizers when *all* the nitrogen is obtained from ARCADIAN Nitrogen Solutions.

Call Nitrogen Division

Listed above are only a few of the reasons why fertilizer manufacturers are finding that it pays to install and use the pre-reactor. If you are interested in producing high-analysis fertilizers in 2-1-1, 3-2-2, 1-1-1 and 1-0-1 ratios, it will pay you to investigate this new and different technique. You will discover you can make great gains in economy, efficiency, safety, volume, quality, and extra profits!

There is nothing complicated about adding a pre-reactor to your present set-up for manufacturing high-analysis fertilizers. The same standard equipment is used . . . nothing is eliminated. For complete details, contact Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N.Y. Telephone: HAnover 2-7300.

Many soils need lime to make fertilizer pay. Sell lime to sell more fertilizer!



SELL LIME NOW!

Fertilizer cannot produce maximum returns on soil which is too acid for the particular crop. In fact, soil acidity can reduce the effects of fertilizer in many instances. It will pay you to urge farmers to test their soils and apply the full amount of lime that is needed for best crop results. This increases the farmers' yields and profits and helps to increase your sales and profits.

Lime can bring the soil to the proper pH level for the crop. In addition, the calcium in lime is an essential plant food. Lime also reduces the leaching of fertilizer. And, lime increases availability of phosphorus, molybdenum and certain other elements essential to crop growth.

Most soils in humid areas need lime to reduce soil acidity for major crops. This acid area includes all the territory east of a line from the Red River of Minnesota through eastern Nebraska down through central Texas.

The amount of lime needed per acre, however, varies greatly from farm to farm, from field to field, and even in various parts of the same field. Soil tests will quickly determine the quantity of lime to use.

For best crop yields, farmers should be using at least 80 million tons of limestone per year. But they are far short of that. In Georgia, for example, the 300,000 tons of lime applied in one year is a small fraction of the 1,700,000 tons needed. In Missouri, one-third of the cropland, previously limed, still needs lime, and about half of the pastureland, previously limed, still needs lime. Most cropland in the humid area needs at least one ton of lime every four years. Some acid clay soils require six or eight tons of lime at the start.

The calcium in lime is an important plant food. A 4-ton alfalfa crop removes 100 pounds of calcium from the soil. That's equivalent to 560 pounds of good quality crushed limestone. A ton of cornstalks contains 10 pounds of calcium and a ton of bromegrass, 8 pounds.

When soil acidity causes poor crops, farmers often blame the fertilizers they use. In acid soils, soil bacterial action is retarded. This slows down release of plant foods from organic matter and speeds leaching of fertilizer.

But the biggest disadvantage of soil acidity is its effect of denying phosphorus to plants. This cripples fertilizer's ability to produce profitable yields. In typical acid soils, highly-soluble phosphates are rapidly fixed in the soil by iron and aluminum into compounds from which crops can get little or no phosphorus plant food.

Liming helps liberate some fixed phosphorus in the soil, and also prolongs the availability of phosphates applied in fertilizer. Research indicates that the highest availability for most forms of phosphorus occurs when soils are limed enough to reduce acidity to a pH between 6 and 7.

Long-term crop yields demonstrate the lasting benefit of liming acid soils. In a 12-year Wisconsin test, lime boosted corn yields 14 bushels per acre per year, and hay yields half a ton per acre per year. With lime *and* fertilizer, the yield increase was two to four times greater. In a 4-year Illinois test, lime raised crop value $18.50 per acre per year.

Spreading lime with dealer trucks helps your fertilizer pay off for farmers. Legumes need lime in the surface soil at planting time. For most other crops, you can lime at any convenient time, before or after plowing. Late summer, with dry, firm ground, is an excellent off-season time for spreading lime on hayland, pastures and small-grain stubble. Fall, after harvest, is a good season for liming row-crop land or meadows.

Outdoor living is a big booming trend in America today. Right now, millions of families are outdoors, walking on a tremendous fertilizer market available to you . . . GRASS.

This market is as near as your neighbor's lawn. It extends as far as the nation's sprawling suburbs, parkland and interstate highway systems. More than 14 million acres of turf present an inviting market for high-nitrogen fertilizers.

Fine healthy turf is desired for parks, playgrounds, golf courses, cemeteries, and airports. Factories and offices are landscaped in grass. Millions of miles of highways are banked by grass.

By far the largest grass area surrounds modern homes. Home-owners take pride in attractive lawns. Turf experts estimate that for every million homes built each year, there is an additional 100,000 acres of new lawn added.

Each year 1½ million acres go out of farming to become homes, roads, factories and recreational areas. Most of this area is planted to grass.

Turf experts call grass "America's most valuable crop." They point out that more money is spent for grass than for any other single crop. And remember, there are no crop surpluses to worry about . . . no acreage allotments . . . no government restrictions on the growth of grass for beautifying the landscape.

Consider a recent survey that indicates approximately 140 million bags of lawn and garden fertilizer in packages of 20 pounds and more were sold during 1958. The survey noted that only 50% of homeowners are actually buying fertilizer.

Present customers often could use more. Non-buyers certainly need to be sold. All customers are potentially repeat buyers; once, twice, even three times each year to keep their lawns and gardens growing well.

Turf experts, garden editors and landscape authorities are advocating high-nitrogen fertilizers for grass. They recommend such grades as 2-1-1, 4-2-1, 3-1-1, 3-2-1 and similar high-nitrogen fertilizers. More important to your formulating plans, these experts are advising that fertilizers for lawns and ornamentals contain long-lasting nitrogen.

Home-owners want attractive lawns. They want fertilizer that is easy-to-use, safe-to-handle; that doesn't burn lawns and plants. Most of all they want to see quick results and uniform green growth. High-nitrogen fertilizers, containing a large proportion of slow-release ureaform nitrogen, are in demand.

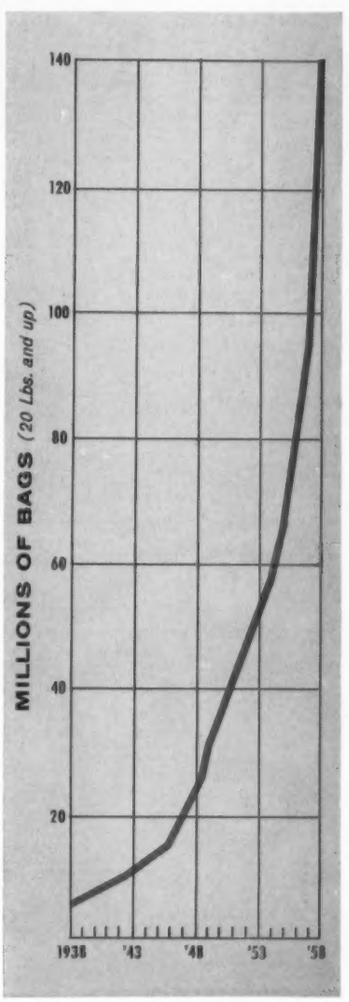
Nitrogen Division research has perfected the process of using N-dure® and urea for manufacturing fertilizers that supply nitrogen to plants at a uniform rate. You can manufacture these popular high-nitrogen fertilizers easily with N-dure, at economical cost.

With N-dure, you can easily make semi-granular, non-segregating, non-burning mixed fertilizers in a variety of popular high-nitrogen combinations. Modern mixed fertilizer that is dustless, easily-applied, safe-to-use, and gives quick growth plus enduring results is in growing demand.

It is estimated that by 1962, over 200 million bags of fertilizer will be bought by non-farm consumers. This vast market is being tapped through garden centers, hardware stores, department stores, food markets and shopping centers.

Find out how easy it is to use N-dure to make your own ureaform nitrogen while blending your mixed fertilizers. Demand for plant food with enduring nitrogen is booming. Start your profit-making specialty fertilizer program now!

A Nitrogen Division technical representative can show you how simple it is to fit N-dure into your production. Contact Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y. Telephone HAnover 2-7300.



Sales of non-farm speciality fertilizers are going up fast—a big market for you!

HERE'S THE BIG LINE OF Arcadian® NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION

Allied Chemical

MAIN OFFICE: 40 RECTOR ST., NEW YORK 6, N. Y., PHONE HANOVER 2-7300

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Omaha 7, Neb., P. O. Box 166.....Bellevue 1464
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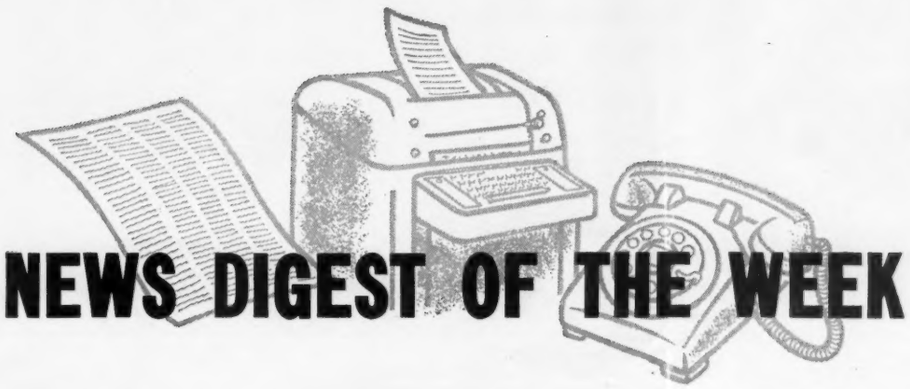
San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840



NEWS DIGEST OF THE WEEK

Sulfur Production in 1958 Down 12% from 1957 Level, Government Report Indicates

WASHINGTON — Production of sulfur in the U.S. during 1958 declined for the second consecutive year, according to the Bureau of Mines, U.S. Department of the Interior. Along with the reduced output, imports increased and the rate of stockpile accumulation of Frasch sulfur producers was also lower.

Production of sulfur in all forms in 1958 amounted to 6.1 million tons, down 12% from 1957, the report states. Of this output, approximately 76% was native sulfur, 10% recovered sulfur, 7% sulfur contained in pyrites, 6% sulfur in smelter acid, and 1% in other forms.

Importation of elemental sulfur into the U.S. increased from 499,401 tons in 1957 to 590,687 tons in 1958 as receipts from Mexico rose sharply. Exports of sulfur from the U.S. remained high despite increased competition from French, Mexican, and other producers in world markets. Three factors that contributed to the maintenance of exports were low prices, low ocean freight rates, and confidence that supplies of Frasch sulfur from the U.S. and Mexico would continue to be available over a period of years.

Reflecting business activity in such major sulfur consuming industries as steel, rubber, and textiles, consumption of sulfur in all forms declined 5% from the 5.6 million tons consumed in 1957. A general increase in demand near the end of the year was insufficient to bring the annual rate to the level achieved in 1957.

A major change occurred in the stockpiling trend in the Frasch sulfur industry during 1958. On Dec. 31, 1958, producers' stocks of Frasch sulfur totaled 4,441,757 tons. These stocks, therefore, increased only about 19,000 long tons in 1958, whereas in 1957 the increase was 487,865 tons and in 1956 it was 753,485. In 1958, 4,037,960 tons was held at the mines and 403,797 tons was elsewhere. Stocks of recovered sulfur totaled 177,271 tons at the end of 1958 compared with 157,075 tons at the end of 1957—a net gain of about 13%.

IMC Buys Oklahoma Fertilizer Facility

CHICAGO—The plant food division of International Minerals & Chemical Corp. has purchased a fertilizer plant in Bartlesville, Okla., the firm has announced. This move extends the corporation's operations into Kansas, and is expected to improve its service in Oklahoma and northern Arkansas.

John D. Zigler, division general manager, said modernization of buildings and machinery, and addition of new equipment will make the plant a leading producer of mixed fertilizers in the Southwest. It will specialize in production of Rainbow, IMC's premium plant food. The plant was formerly operated by Moneka Farm Stores, Inc., and has been inactive during the past year.

Sales from Bartlesville to western sections of Oklahoma and Kansas will be handled through the plant food division district sales office in Ft. Worth, Texas. Eastern Oklahoma, eastern Kansas, and northern Arkansas are assigned to the division's district sales office in Texarkana, Arkansas.

Production Manager

LOS ANGELES — Appointment of James O. Brown as manager of finished products for the production department of the Pacific Coast Borax Co. Division of United States Borax & Chemical Corp. has been announced by R. T. Edgar, divisional vice president.

Mr. Brown will be responsible for the coordination of scheduling for packaging, loading and shipping of finished products.

Becomes Manager of Fertilizer Manufacturing

KANSAS CITY, MO.—Gordon E. Hoath is to become manager of fertilizer manufacturing for Consumers Cooperative Assn. here on Sept. 1, according to announcements made by the co-op. Mr. Hoath was manager of CCA's fertilizer and protein plants at Eagle Grove, Iowa. He joined the staff in July, 1947 and went to Eagle Grove that year after having worked briefly at Enid, Okla. and Coffeyville, Kansas.

Mr. Hoath is native of Anthony, Kansas, and a graduate of Kansas State University at Manhattan. In the new position he will have full supervision of CCA's fertilizer manufacturing plants at Muskogee, Okla., St. Joseph, Mo., and Eagle Grove.

Stauffer Increases Thiol Capacity by 50%

NEW YORK — Stauffer Chemical Co. plans to construct a new thiol (p-chlorothiophenol) plant at Henderson, Nevada. The planned facilities will increase Stauffer's thiol capacity by 50%.

Thiol is the principal intermediate in the production of Trithion, the insecticide-miticide developed by Stauffer and produced for international sale at Henderson, Nevada.

The new plant, which will be based on a process developed by Stauffer's Richmond (Calif.) research laboratories, will enable the company to integrate and expand its output of Trithion.

California Firm to Build Chemical Plant

SAN FRANCISCO—Plans for construction of a maleic anhydride plant have been announced by Fred Powell, president of California Chemical Co., a subsidiary of Standard Oil Company of California.

The unit will have a capacity of 20,000,000 lb. of the chemical annually, and will be built at Standard's refinery at Richmond, Cal. It is scheduled for completion by mid-1960.

Maleic anhydride is a chemical intermediate employed in production of agricultural chemicals and a number of industrial products.

TVA Issues 40 Free Licenses in Current Year

WILSON DAM, ALA.—The Tennessee Valley Authority reports that it has issued during the 1959 fiscal year, 40 royalty-free licenses for use of its fertilizer processes or for the manufacture of TVA-developed equipment. This brought to 184 the number of such licenses issued to 148 companies.

Research at TVA's office of chemical engineering at Muscle Shoals has resulted in 118 patents.

Sixty percent of the licenses issued are for use of the continuous ammoniator or for the manufacture of the equipment needed in the process. Eighty-six licenses have been granted for use of the process, and 21 to manufacture the equipment. The continuous ammoniator, installed in at least 138 U.S. plants, permits the making of high-analysis granular fertilizers with conventional materials. About two-thirds of the granular fertilizer made in the country now is produced by this method.

Twenty-six licenses have been granted to use the superphosphate mixer, and 11 companies to manufacture the equipment. The mixer, called the continuous cone mixer, is used in the production of either ordinary or concentrated superphosphate.

Twenty-four licenses have been issued for use of liquid fertilizer processes developed by TVA; and 16 for use of various other patents, including those on the rotating furnace, a process to expand slag, a process for production of calcium metaphosphate, and others.

Some of the licensed companies have multiple installations of TVA-type equipment. One company has continuous ammoniators in 16 of its plants from New York to Iowa; 12 companies are licensed to use both the continuous ammoniator, and the superphosphate mixer.

N. Carolina Legislature Changes Fertilizer Law in 1959

RALEIGH, N.C. — North Carolina has amended its fertilizer law, according to reports from John L. Reitzel, assistant commissioner of agriculture for the state. Here are some of the sections in the law and brief explanations of some of the changes of interest to fertilizer manufacturers doing business in the state.

North Carolina Fertilizer Law (Article 2, Chapter 106, G.S.)

Sec. 106-50.3 (f). This definition of a mixed fertilizer brings all fertilizers mixed by a manufacturer or a contractor in advance of the application, and the application of two or more fertilizer materials at the same time by the same operation under all of the provisions of the fertilizer law.

Sec. 106-50.3 (r). A definition of "Contractor", not formerly a part of the North Carolina Fertilizer Law, is added.

Sec. 106-50.4 (a) (4). Change in this section authorizes the commissioner of agriculture to permit variation in the order and form of the labeling required for fertilizers when applied to packages of 25 lbs. or less. Proposed variations are subject to approval by the commissioner before use.

Sec. 106-50.4 (d). This is new legislation, requiring that fertilizer manufacturers as defined under Section 106-50.3 (m), and fertilizer contractors as defined under Section 106-50.3 (r) be licensed by the commissioner of agriculture before engaging in these businesses in the state.

The approved application for registration of mixed fertilizer or fertilizer materials of manufacturer's brands and grades of fertilizers fulfills also the requirements for the licensing of such manufacturers.

All contractors, whether manufacturers or not, are required to get "contractor's" licenses. This means that a manufacturer who is also a contractor for applying fertilizers to the soil will require both licenses. Applications for these licenses must be made on forms procured from the commissioner of agriculture.

Sec. 106-50.6 (a). This section carries the provisions for the payment of the 25¢ per ton inspection fee; and, for packages of 5 lbs. or less, the payment of an annual $25 per brand registration fee in lieu of the tonnage fee. It further provides for the promulgation of regulations by the board of agriculture to apply to any brand sold in 5 lb. packages or less if the volume of that brand sold exceeds 100 tons a year.

Sec. 106-50.6 (b). Reporting System. As amended, this section eliminates the use of tags and stamps in the payment of inspection fees. It provides for the payment of all such fees through a reporting system. Application forms for setting up operations under the reporting system will be supplied by the commissioner.

The reporting system is not required for brands sold only in packages of 5 lbs. or less when the annual volume of such brands sold does not exceed 100 tons. These are covered by the $25 per annum registration fee paid in lieu of tonnage fees. Grade-tonnage reports on these brands, however, are required.

Sec. 106-50.11. Revision of this section exempts from grade list requirements fertilizers sold in packages of 25 lbs. or less.

Sec. 106-50.14. Amendment to this section clarifies questions regarding publication of results of analyses.

Secs. 106-50.20 (k) (1) are revisions to cover preceding changes in the law dealing with licensing and reporting permits.

Liquid Fertilizer Law (Article 8, Chapter 81, G.S.)

Sec. 81-74. The definition for "Contractor" is transferred to the N.C. Fertilizer Law (G.S. 106-50.3 (r)).

Sec. 81-77. The requirement for annual registration of contractors, likewise, as in the preceding paragraph, is transferred (G.S. 106-50.4 (d)).

The effect of these transfers is to require the annual registration of all contractors (formerly limited to those applying liquids) who apply fertilizers to the soil, according to Mr. Reitzel.

What's New?

Additional information is available about new products, new services, and literature described in this department. Circle the numbers of items on which you desire more information, fill in your name, your job title, your company's name and address on the card. Then clip it out of the page and mail. No postage is necessary.

No. 9107—Welded Steel Pulleys

A new booklet, "Die Crown Welded Steel Pulleys," issued by Link-Belt Co. describes a new hydro-expansion-formed belt conveyor pulley that its makers say increases conveyor belt

life, has a 25% greater strength, is concentric to within .030 inch and is free from crown welds.

The Die Crown welded steel pulley is formed in a die by hydraulic pressures for accurate control of crown contour and pulley diameter. They are also free from back-up welding bars. Belts are more easily trained on the formed crown and true centering aids in initial belt settings.

The new publication gives detailed engineering and selection data. Information on lagged pulleys, shaft and pulley assemblies is also given. A copy of the booklet is available by checking No. 9107 on the coupon.

No. 9121—Conveying Systems

Power-Curve Conveying Co. has issued new literature on a new conveying surface which it claims has at least three times the service life of previous materials. The new 1960 model car loaders and bag conveyors use spring steel belts to permit a continuous bag conveying surface which can be swung to right or left for high speed loading of box cars and trucks and for all other bag conveying service. A change in steel analysis and spring manufacturing technique is now used. The new car loader is said to be stronger and simpler, capable of taking greater abuse. With such a loader installation, one man can load without aid at least two box cars an hour, the makers state. For descriptive literature, check No. 9121 on the coupon.

No. 9123—Phosphate Determination Method

How to continuously determine phosphate concentrations down to 0.01 ppm using "AutoAnalyzer"®, continuous automatic chemical analysis equipment is described in a new methodology sheet published by Technicon Controls, Inc. The Technicon® AutoAnalyzer automates each step of the chemical analysis and integrates it into a continuous flow system which provides accurate, dependable analysis with exact reproducibility.

The determination is based on the reduction of a phosphomolybdate to molybdenum blue by 1-amino-2-naphthol-4-sulfonic acid. An air-segmented stream of sample and water is passed through a dialyzer to give an air-segmented standard sulfonic-molybdate solution. The main stream is next mixed with standard aminonaphthol sulfonic acid reagent containing sodium sulphite and sodium bisulphite and then sent through a heater into the AutoAnalyzer's colorimeter unit. Phosphate concentration is measured by colorimetric means using a 659 mu. filter.

Included in the new methodology sheet are flow diagrams of the system together with typical recordings and calibration curves. Copies may be obtained by checking No. 9123 on coupon.

No. 9105—Materials Handling Catalog

A new 16-page catalog describing and illustrating its complete line of materials handling equipment is available from Lewis-Shepard Products, Inc. Designated as "Condensed Catalog 80-204" the presentation offers specifications and illustrations on Rider Fork Lift Trucks, Rider Tractors, Narrow Aisle Rider Electrics,

Electric Powered "Walkies" and Manual Equipment.

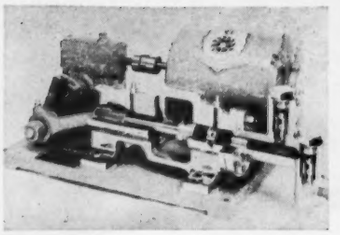
An equipment selector chart gives quick visual reference to each type of equipment manufactured in every line of materials handling equipment.

For a free copy of catalog check No. 9105 on coupon.

No. 9114—Pumps

Information on high pressure, low capacity, variable volume, reciprocating plunger pumps for feeding as little as 1.5 gph. to as much as 108 gph. of corrosive or non-corrosive liquids into chemical processes and other applications where extreme accuracy and long pump life are requirements are now available from Walter H. Eagan Co., Inc. Further information on packaged chemical feed units incorporating these pumps with tanks ranging from 50 to 250 gal. capacity is also available. The pumps are said to normally handle pressures to 625 psi and several thousand psi with special construction, and are available in 304 and 316 stainless, Hastelloy, Carpenter 20 and other steels and ceramic plungers when corrosive liquids are to be metered.

Accuracy is maintained through



double suction and double discharge ball checks and seats which have long life since the design eliminates excessive spinning of the balls, seat wear and pockets where harmful deposits may build up. Manual or automatic adjustment of the stroke can be made from 0 to full stroke while the pump is in operation through a special stroke control mechanism. Check No. 9114 on coupon for further details.

No. 9120—Conveyor Belt Cleats

Rubber conveyor cleats that are easily installed with belt punch and screwdriver have been developed by the Holz Rubber Co., Inc. These simple "Bolta-Flite" cleats bolt securely to fabric, woven metal or chain belting of any width. They are of resilient rubber construction to safeguard "soft" products and increase belt life.

Cleats are available in black or white rubber, or neoprene in standard heights up to 4 inches, the maker says. The manufacturer states that bolts and washers are of rust-proof material and are countersunk to eliminate protruding surfaces for better sanitation and efficiency. Special metal stiffeners for heavy duty service are also available from the manufacturer. For descriptive literature, check No. 9120 on the coupon.

No. 9122—Corrosion-Proof Nozzle

OPW-Jordan offers literature on its new stainless steel and aluminum automatic shut-off chemical nozzle, designated as its No. 1190. The device is specifically designed for use in handling chemicals where bronze is objectionable. The nozzle shuts off automatically when drum, barrel or tank is full. It is balanced for easy handling, the makers say, and has hold-open notches to free the operator for other work while nozzle is being used. The makers say it has permanent, self-adjusting packing and is tamper proof and leak proof without adjustment. Capacity from 17-60 GPM, 1½" sizes. Full details available by checking No. 9122 on coupon.

No. 9118—Safety Glasses

Literature on a new type of lightweight safety glasses to protect workers from flying objects is available from General Scientific Equipment Co. The new glasses are said to combine attractive styling with featherweight protection. The makers state that the "Safety Specs" are useful in handtool operations, inspections and protection of prescription glasses. They are available with clear or green lenses. Complete information is available by checking No. 9118 on coupon.

No. 9119—Heavy-Duty Fork Lift Trucks

Gerlinger Carrier Co. has issued a new booklet on materials handling equipment featuring descriptions of its line of heavy-duty lift trucks. Lift truck components outlined in the manual include heavy-duty industrial-type engines—specially engineered for stop-and-go driving involved in most materials handling applications; plus a stationary-type load axle that carries all deadweight to protect the differential from stress and strain; and Torqmatic drive to reduce driver fa-

Send me information on the items marked:

- ☐ No. 9100—Bulk Scale
- ☐ No. 9102—Floor Coating
- ☐ No. 9105—Materials Handling Catalog
- ☐ No. 9107—Welded Steel Pulleys
- ☐ No. 9112—Impact Mill Data
- ☐ No. 9114—Pumps
- ☐ No. 9117—Bulletin
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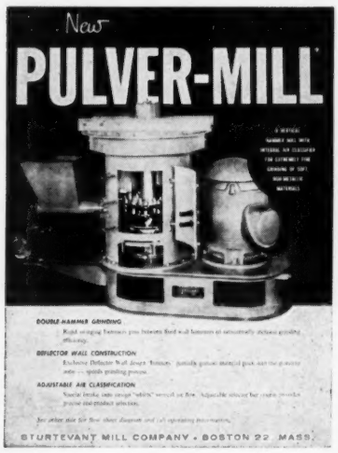
tigue and cut down lift truck maintenance costs.

Among the engineering features described in the booklet are a pivotal-mounted steering axle, electrically-welded all-steel frame, and a counterweight of advanced design—styled to provide minimum turning radius for large-capacity units. Gerlinger Lift Trucks come in 27 models with capacities ranging from 8,000 to 40,000 pounds. For a copy of the manual, check No. 9119 on coupon.

No. 9112—Impact Mill Data

Literature on the new Sturtevant Pulver-Mill, a vertical impact mill with an integral air classifier, introduced recently, is now available from Sturtevant Mill Co. The literature includes a flowsheet and operating information on the new unit, which can handle up to two and a half tons an



hour of soft, non-metallic materials.

The mill is said to offer three exclusive features: double-impactor grinding, exclusive deflector wall construction to "bounce" partially ground material back into the grinding zone while speeding grinding, and adjustable air classification providing for precise end-product selection. Check No. 9112 on the coupon, and mail.

No. 9102—Floor Coating

A new four-page brochure describing "Garpoxy," protective coating for floors, walls, and machinery, is made available by the Garland Co.

According to the manufacturer, Garpoxy has hard "baked-like" finish resistant to wear and abrasion. The product requires no primer. It is recommended for "corrosion problem" floors, walls, machinery, and equipment in chemical and plating plants. The manufacturer recommends it for floors where abrasion, chemicals, acids, soaps, oils, detergents, solvents, greases, alkalis, and caustics are problems. Copies of the brochure are available by checking No. 9102 on the coupon.

No. 9117—Diatomite Technical Bulletin

A new 4-page service bulletin giving complete technical data and properties of its diatomaceous earth products is now available, free, from Aquafil Co. The diatomaceous earth, mined and processed by Aquafil is fully described. The bulletin describes the many uses of Aquafil diatomite, among them insecticide and high analysis fertilizer conditioning. For a copy of the bulletin, check No. 9117 on the coupon.

No. 9100—Automatic Bulk Scale

Specifications and performance characteristics of the E-50, automatic bulk scale for consecutive or cumulative process weighing by batch or continuous operation, are set forth in a six-page bulletin in color recently reissued by Richardson Scale Co.

Eight photographs and seven line drawings are employed to illustrate special features, indicate dimensions and structural arrangements, and suggest methods of application and installation. Optional equipment is described, and some of the materials that have been handled effectively by the E-50 are listed.

Scale sizes available in terms of capacity are shown in a chart. For copies, check No. 9100 on the coupon and mail.

Alabama Plant Food Content Jumps in 1958

The 1958-59 Alabama fertilizer tonnage increased 15.3% over the preceding year, according to the Alabama Soil Fertility Society. Actual tonnage was 1,045,562 as compared with 906,834 tons in 1957-58.

An important trend is indicated by the increased use of 4-12-12 grade, 252,955 tons in contrast to 187,370. Unrecommended grades continued their downward trend. The plant food content in all mixed goods increased with 25.7% as compared with 24.9% in 1957-58 and 24.4% in 1956-57.

The Alabama situation, sometimes referred to as the "high-low" fertilizer story, is seen clearly in the following table:

Percent of mixed fertilizer grades bought by Alabama farmers and that needed for high yields according to soil test information.

Years	High P Low K	Equal P-K	Low P High K
State Needs	7	79	14
1958-59	36	62	2
1957-53	40	57	3
1956-57	49	48	3
1955-56	69	29	2
1940-41	100	0	0

TVA Purchases Noted

KNOXVILLE, TENN. — The Tennessee Valley Authority has released figures on its purchases of materials during the 1959 fiscal year, stating that a total of $125,936,788 was spent for materials, equipment, supplies and non-personal services. Of this total, $66,924,517 was for manufactured articles (turbines, generators, transmission lines, etc.); $51,931,238 for raw materials (coal, coke, sand, aggregates, etc.); and $7,081,033 for miscellaneous services (barging, labor costs in installation contracts, transfer services at shipping terminals, etc.).

FERTILIZER TAX RISES

TOPEKA, KANSAS—The fertilizer tax in Kansas is now 20¢ ton, having been raised from 15¢ on July 1, 1959. The increase in the fee was authorized by the state board of agriculture.

CONTROLS

Continued from page 12

the entire length rather than at one point.

Arc shields should be checked to make sure they are in place and not obstructed with dirt. If severely coated with carbon or copper deposits, they should be cleaned.

Some controllers have dashpots which may be air or liquid filled. If oil-filled dashpots, only special dashpot oil should be used. The dashpots should be checked to make sure they are not sticking or binding.

The oil on high voltage oil-immersed contactors and circuit breakers should be maintained at the recommended level, and should be periodically inspected for water, sludging and excess carbon. →

Some of the most frequent difficulties common to most electrical control devices are pin-pointed in the trouble-shooting chart accompanying this article. Also shown is a preventive maintenance check list to serve as a guide in setting up a thorough maintenance program.

FOREMEN

Continued from page 11

The goal of every safety-minded foreman or supervisor is to develop in his workers safe working habits that stick.

The key to a good safety record is to keep everlastingly after accident prevention. That means keeping the subject alive, without letting it become tiresome.

When a new worker has been taught how to work safely, check on his progress regularly to be certain that he does not develop unsafe habits. Ask him a question now and then. A why or how question will let you know whether he remembers the instructions he has been given.

Finding someone to blame when an accident happens does not remove the cause. After every accident take steps to prevent it from happening again. This may require further instruction, an improved guard on a machine, a thorough discussion with your safety committee, or a recommendation to top management for further action.

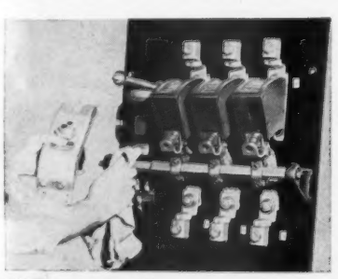
Check up regularly on the observance of safety rules. Infractions should be corrected promptly. If a safety rule is out of date, take such action as may be necessary to change it or eliminate it. Keep your rules to the smallest number necessary.

Keep a record of all accidents in your department. By reviewing it regularly, you will be alerted to those people who have the most accidents. It will also help you spot jobs or operations which may need more safety attention.

Make it a point to speak about safety to each one of your workers individually at regular intervals. Just a few words about safety will be enough. The constant reminders will help keep your workers thinking about safety.

CONTROL TROUBLE-SHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	CURE
MANUALLY OPERATED CONTROLLERS		
Excessive Contact Burning.	Low contact pressure, contacts not properly aligned	Adjustment by inspection. On drum controllers adjust star wheel lever spring to center the finger so it strikes the contact squarely.
Burning Out Resistors.....	Starting sequence stopped at mid-point	Instruct operator.
Failure to Pick Up.....	Low voltage on coil	Check system.
Failure to Hold in.....	Coil burned out, or wrong coil	Replace.
	Excessive magnet gap	Check gap.
Failure to Drop Out.....	Mechanical binding	Clean and adjust.
	Contact welded	See Contacts.
	Voltage not removed	Check circuit.
THERMAL OVERLOAD RELAYS		
Failure to Trip.....	Wrong size heater	Check instruction sheets.
	Mechanical binding	Clean and adjust.
	Relay damaged by short circuits	Replace relay.
	Motor and relay in different ambient temperatures	Install motor and control in uniform temperature.
Trips at too Low Current...	Wrong heater	Check instruction sheets.
	Heater assembled incorrectly	Check instructions.
	Heater in high ambient	Install relay and controller near motor or in cooler place.
	Wrong calibration	Refer to factory.
Trips on Starting.....	Starting cycle of motor too long	Refer to factory.
Failure to Reset.....	Broken mechanism	Replace relay or broken part.
Burning of Relay Contacts.	Short circuit	Check wiring of push-button in the circuit.
	High coil current	Check holding coil current
	Vibration	Remount control.
	Dirt and corrosion	Clean and adjust.
	Misapplication	Use interposing relay if handling too high coil currents for relay contacts.
CONTACTS		
Short Contact Life.....	Interrupting too high a current	Use special tips or next larger size contactor
	Using oil immersed device when air should be used (Note: Contacts burn many times faster in oil than in air.)	Use air break device if oil is not necessary or if oil is imperative, try heavier duty oil-immersed device.
	"Bounce" on opening or closing	Readjust contactor for "bounce."
	Abrasive dust	Dust tight enclosure
	Low contact pressure	New contacts and or springs.
	Frequent jogging	Larger size contactor.
Contact Chatter or Pumping	Poor contact in control circuit	Check connections in control circuit.
	Fluttering control relay, such as pressure or temperature switch	Repair pilot device.
	Broken shading coil	Replace.
	Bad interlock	Increase wipe and pressure on sealing interlock.
Overheating.....	Copper oxide	Clean lightly with file.
	Heavy load for more than eight hours continuous operation	Use silver alloy tips.
	Overloaded	Reduce load or use larger control.
	Weak contact pressure	Clean and adjust. Replace contact spring and contact if wear allowance is used up.
	Poor connection	Tighten.
Weak Pressure.....	Worn tips	New tips.
	Poor adjustment	Readjust gap and wear allowance.
	Low voltage, magnet not sealing	Correct voltage, use lower voltage coil.
Welding of Contacts.....	Poor spring pressure	New springs.
	Abnormal currents	Less current, larger device or non-welding contact tips.
	Repeated jogging or inching	Controllers must be derated for jogging duty due to severe strain.
		Use next larger device or tell operator to jog more slowly. Special alloy tips may also help.
	Low Voltage—Contact may drop part way open on slow dips of voltage	Raise voltage.
	Bouncing of contactor	Eliminate overvoltage and or mechanical difficulties.
COILS		
Open Circuit.....	Contacts not sealing	Eliminate mechanical binding of contactor.
	Failure to insert protective resistor on dc	Interlock not making contact—
		Repair interlock.
	Mechanical injury	Replace coil; use more care.
	Very rapid jogging	Check application.
	Short time rated coil energized too long	Check timing sequence.
	Overvoltage and/or high ambient	Check circuit and application.
Coil Failure.....	Moisture or corrosive atmosphere	Special coils.
SLIDING CONTACTS Used on rheostats, knife and drum switches		
Overheating.....	Overcurrent, weak contact pressure	Dress copper contacts or use special alloy contacts. Lubricate contacts periodically as recommended.
Excessive Burning.....	Rapid lever operation	Operate more slowly to eliminate starting across the line which causes burning of contact surfaces and flash-over.
Irregular Surfaces.....	Lack of maintenance	Smooth over contact surface and lubricate. Do not use emery cloth.
Abrasion.....	Lack of lubrication	Apply light coat of vaseline.
MAGNETS		
Noisy.....	Low Voltage	Raise voltage or use lower voltage coil.
	Broken shading coil	New shading coil or if face of magnet is worn down, install new magnet frame.
	Dirt	Clean sealing surface of the magnet and bearing points; lubricate with good grade of white machine oil.
	Misalignment	Realign.
Fail to Open.....	Grease on magnet surface	Clean.
	Misalignment	Realign.
	Contacts welded	(See contact welding).



When cleaning the magnet assembly with a solvent, don't let the coils become soaked. Care should also be taken to prevent breakage of auxiliary movable contacts when the magnet assembly is dropped open.

Proper installation and maintenance of control is vital to its ability to perform satisfactorily. Checking the line voltage is a wise precaution. Low voltage is apt to show up especially during starting.

Salt Suspension Fertilizers Reported to Look Promising in TVA Laboratory Tests

Preliminary work has been carried out by the Tennessee Valley Authority on increasing the grade of liquid fertilizers by carrying nutrient salts in suspension. The products are made in the usual way but the amount of water is reduced so that salting out occurs on cooling. The crystallized salts are kept in suspension by use of a suspending agent or other means for producing a stable suspension, reports H. K. Walters, Jr., of the applied research branch of TVA.

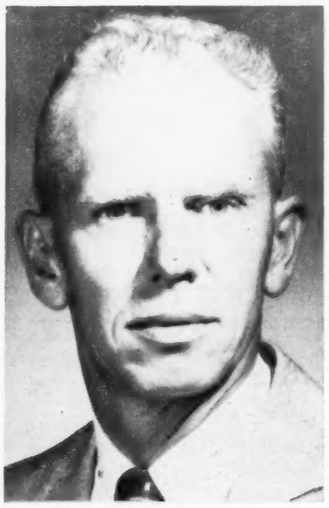
In small-scale tests clay was found to be an effective suspending agent. Only a small amount was required. Two types of clay were tested, a bentonite and an attapulgite. "To get the maximum suspending effect, it was necessary to disperse the clay thoroughly before adding it to the liquid fertilizer. The clay was mixed with water in a ratio of 1:9 parts by weight and the mix subjected to a shearing mixing action by pumping through a gear pump. The resulting 'master batch' was then used to supply clay to the liquid fertilizer," he said.

"The clay additive not only stabilizes the suspension and minimizes settling, but also has an inhibiting effect on growth of the salt crystals in suspension. Presumably the clay furnishes a large number of nucleation sites, thereby increasing the number of crystals and reducing the average crystal size. The increase in viscosity resulting from the clay addition probably also slows down crystal growth.

"Several suspensions containing clay have been made in bench-scale tests from both furnace phosphoric acid and wet-process phosphoric acid. A stepwise neutralization procedure was used, i.e., all the acid was added to the reactor before neutralization was started. The amount of clay used was 1% by weight of the total suspension. After storage for a week at 32° F., the products were pumped with a 'squeeze' type pump through a nozzle (6/64-in. diameter). Grades such as 5-15-15 and 14-14-14 made from furnace acid pumped satisfactorily, as did a 14-14-14 made from wet-process acid. Supplemental nitrogen for the 14-14-14 products was from urea.

"Because of the impurities present in wet-process acid, it behaves somewhat differently from furnace acid in salt suspensions. There is some indication that the precipitated impurities have a suspending effect on nutrient salt crystals, especially if the pH is kept high during neutralization."

Mr. Walters emphasized that this work was preliminary in nature, and there are a number of factors not completely investigated which might have a bearing on distribution in field application equipment. No commercial production of salt suspensions is under way at present, he indicated, although a few trial runs have been made.



Phillip T. Maddex

CHIEF ENGINEER—Phillip T. Maddex has been named chief engineer of United States Borax & Chemical Corp. He will direct engineering activities of the company from headquarters in Los Angeles. The company is the parent organization of United States Potash Co. and Mr. Maddex responsibilities will include the potash mining operations at Carlsbad, N.M. along with other mining and processing facilities at Boron and Wilmington, Cal. and Burlington, Iowa.

Lime Consumption Down For 1958, U.S. Reports

WASHINGTON—During 1958, 10% less lime was manufactured than in 1957, and 13% less than during the all-time record year 1956, according to reports of producers to the Bureau of Mines, U.S. Department of the Interior. Total national lime production in 1958 was 9 2 million short tons compared with 10 3 million short tons the year before. This loss was entirely in open-market lime, which dropped from 8.5 to 7.4 million short tons or 13%. Captive lime tonnage increased 4% despite the general decline in production.

All major use categories, except construction, declined by moderate to large percentages, compared with 1957: agricultural lime, down 6%; construction lime, up 8%; chemical and industrial lime, down 8%; and dead-burned dolomite or refractory lime, down 26%. Quicklime comprised 60%, hydrated lime 22%, and dead-burned dolomite 18% of the total lime production. Sixty-seven percent of the total lime in 1958 was used by chemical and industrial plants, 18% was refractory material, 13% was used in construction, and 2% in agriculture.

Canadian Report

OTTAWA, ONT., CANADA — Canadian output of mixed fertilizers for the first half of 1959 was 477,980 tons, as compared to 408,571 tons in 1958, according to reports from Ottawa. Production of other chemicals in this same period was as follows:

Hydrochloric acid, 20,919,697 lbs. (19,144 362 in 1958's first half); sulphuric acid, 814,383 tons (749,182); chlorine, 139,029 tons (130,092); formaldehyde, 26,630,702 lbs. (22,348,-145), and sodium hydroxide, 165,058 tons (148,817).

Compact, Efficient Liquid Plant Licks Manufacturing Ills

ONE OF THE NEWEST and most compact fertilizer plants in Arkansas is the Farmers Liquid Fertilizer, Inc., at Patterson. Located in the river valleys that merge into the flatlands of the Mississippi River, this firm serves farmers for a radius of nearly 100 miles.

The plant was completed in the autumn of 1957 by G. L. Morris, a veteran cotton gin owner of the area, and his son-in-law, Paul F. Lovett, now president and general manager of the company.

The 40 x 60 ft. building, in which all mixing equipment is kept, is of brick construction. Adjoining this is an air-conditioned office 12 x 22 ft.

The firm makes liquid fertilizer only, with the principal mixtures being 14-7-7, 5-10-10, 10-10-10, 8-24-0, and 3-12-12. The company also ships in anhydrous ammonia and sells to rice, cotton and soybean farmers of eastern Arkansas.

"When we built the plant, one thing we kept in mind was compactness," said Mr. Lovett. "It takes only two of us to operate it, plus a bookkeeper."

Potash is brought into the plant via a belt conveyor from the railroad car. It comes through an opening in the wall and is dumped in a large bin on the same level as the floor. From here it is shoved into a screw conveyor and carried into the mixers. Liquids are sent to the mixers through pipes which connect to outside storage. All work is handled automatically by use of an electric panel board.

After mixing, the complete fertilizer is again sent through pipes to storage tanks or directly into trucks. The plant can mix about 20 tons per hour.

Potash storage inside the main building approximates three carloads, while the outside liquid storage is about 120,000 gallons. In addition, the firm has enough nurse tanks and field tanks to hold another 80,000 gallons.

"We seldom try to fill all our storage," said Mr. Lovett, "but usually have around 100 to 200 tons mixed at all times."

The liquid plant utilizes the TVA patented process for making superphosphoric acid. Such TVA patents are granted to manufacturers on a royalty-free basis.

All ingredients are shipped to the plant by rail, but the completed products are distributed by trucks. The company has four large trailer-tanks and two large ground tanks which are used for carrying and holding fertilizer. It also has 20 smaller tanks which hold 500 gallons each. These are on wheels and can be pulled to the various farms and to retail dealers.

"We work with dealers and also direct with farmers," said Mr. Lovett. "In the immediate area, most sales are direct to farmers, but in communities some distance from here we deliver to the dealers. However, we do lend assistance on all technical and sales problems."

In building up sales, Mr. Lovett found that a good educational program was necessary, because few farmers were using as much fertilizer as needed, and too often they applied the wrong kinds. The manager holds farm meetings, takes soil samples free of charge, and often works out a complete fertilization program with farmers.

"We not only try to sell fertilizer," he pointed out, "but we must keep that farmer's financial problems in mind. Many times we have been able to show him easier and cheaper methods of application."

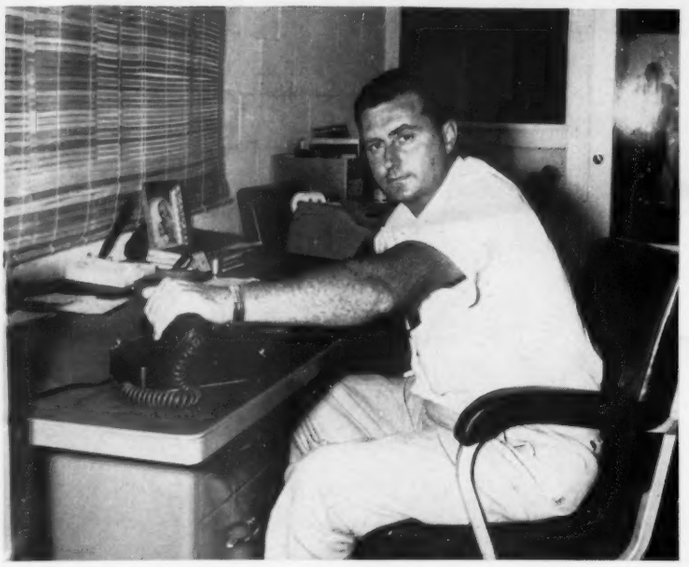
A lot of this promotional work is done in the off season, but advertising is stressed most heavily in the busy season from March to mid-summer, when the plant is running almost at full capacity. The management advertises in several newspapers and TV which cover the trade area.

One boost to sales has been the liquid tanks which farmers may use free of charge. The plant loads the tank and then pulls it to the farm where it may stay until the end of the season. A close check is kept on the contents, and when more fertilizer is needed the storage tank is refilled.

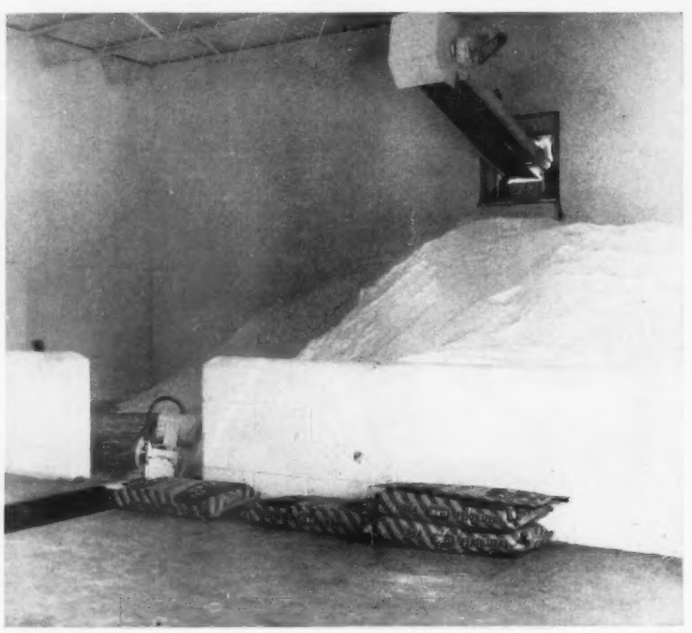
"There is some upkeep and expense to this service," said Mr. Lovett, "but it's about the only way a liquid fertilizer plant can operate. Farmers often don't have the money or don't want to spend it for liquid storage, but are usually eager to buy from us when the storage is furnished."

Because of an aggressive selling campiagn, sales have doubled within the last year. Mr. Lovett spends much time with farmers, particularly in the slack season.

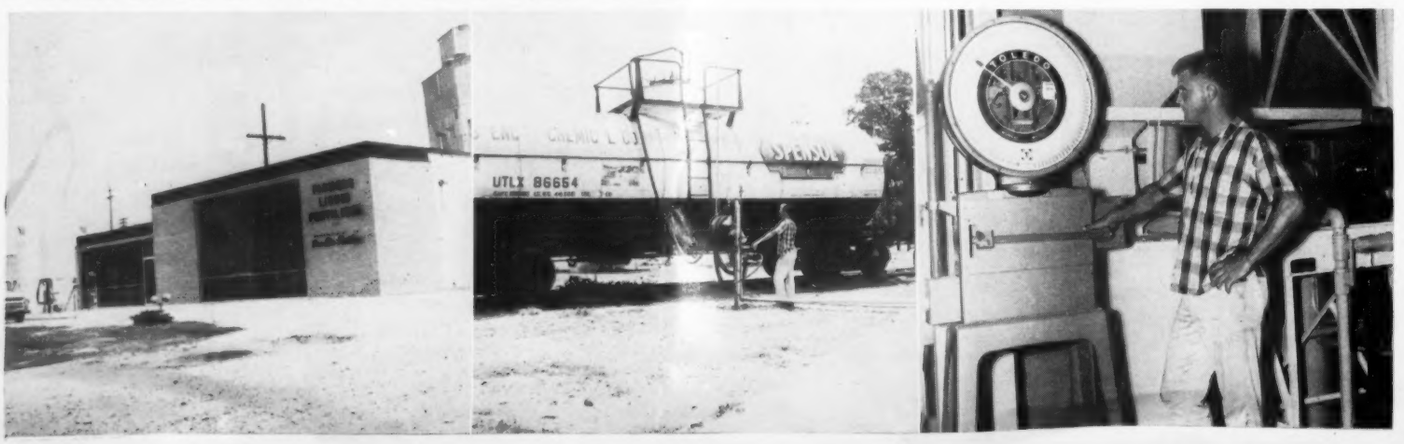
"Despite our new plant which mixes fertilizer quickly and efficiently, the job of selling it is still the main problem," Mr. Lovett explained. "This means you must know the soils, the crops and people, and work diligently to help them with their problems. It doesn't mean high-pressure salesmanship so much as it does in knowing what will help these growers make more money. When you get a few of these answers, the selling will take care of itself."



HEADS FIRM—Paul F. Lovett, president and general manager of Farmers Liquid Fertilizer, Inc., operates modern plant at Patterson, Ark. The company makes liquid fertilizers only, in five principal grades.



POTASH STORAGE—Potash for liquid mixed fertilizers is conveyed by belt through opening in wall, dumped in bin, and later taken into mixers by screw conveyor in floor at left.



LIQUID PLANT—Headquarters of Farmers Liquid Fertilizer, Inc., at Patterson, Ark. (Left) Although plant is in small town, it is located on railroad and in center of rice, soybean and cotton area. Center photo shows car being unloaded into storage tanks or directly into mixer. Two men and a bookkeeper can operate plant which mixes 20 tons an hour. At right, is Dan Taggart, assistant manager at automatic scales. Plant, completed in 1957, is 40 by 60 ft. Adjoining office is 12 x 22 ft.

New Engineer Named by U.S. Borax & Chemical

CARLSBAD, N.M.—Arthur J. Weinig, Jr., Carlsbad, has been named to the position of assistant chief engineer of the U.S. Borax & Chemical Corp., according to announcement by Dr. D. S. Taylor, vice president and general manager of the firm's research company.

Mr. Weinig will be responsible for all activities of the corporate engineering department which are conducted here, reporting directly to Phillip T. Maddex, chief engineer for the corporation.

The appointee was graduated from Colorado School of Mines with a degree in metallurgical engineering in 1938. Immediately following graduation he joined Potash Co. of America in Carlsbad, where he became plant superintendent in 1947, the position he held until he resigned in 1956 to join Farm Chemical Resources Development Corp. In 1958 he became associated with the New Mexico Thorium Corp. as general superintendent and remained in that capacity until joining U.S. Borax & Chemical Corp.

Indian Sulfuric Acid Plant Nearly Complete

BHILAI, INDIA—A new sulfuric acid plant with a capacity of some 12,000 tons a year is nearing completion here and is expected to be in operation within the next few months, the Information Service of India has announced.

The acid will be utilized in manufacturing ammonium sulfate. The unit for making sulfate is expected to be ready for use by the fall of 1960.

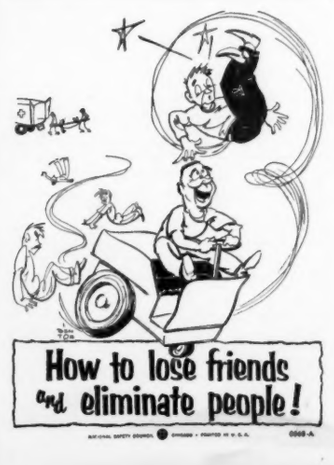
Hooker Names Two

NIAGARA FALLS, N.Y.—R. George Hartig and James D. Thaler have been named supervisors of process design and plant design respectively, for the phosphorus division of Hooker Chemical Corp. They will report to E. J. Bissaillon, technical manager.

In making the announcement, F. Leonard Bryant, division general manager, explained that the appointments are part of a new program designed to provide continuing support for all production plants and to meet increased engineering requirements. Division plants are located at Adams, Mass.; Columbia, Tenn.; Dallas, Texas; and Jeffersonville, Ind.

To Resume Building

CHANDLER, ARIZ.—Southwestern Nitrochemical Corp. has received approval for a county building permit, thus permitting resumption of construction of its plant three miles southeast of Chandler. The firm will manufacture anhydrous ammonia for use in agriculture.



CONSUMPTION

Continued from page 3

13.0% of the potash used.

The national use of nitrogen increased 149,072 tons of which 11,578 tons (7.8%) were supplied by mixtures, and 137,494 tons (92.2%) by materials.

National use of available phosphate decreased 12,102 tons. The quantity in mixtures decreased 19,036 tons while that in materials increased 6,934 tons.

National use of potash decreased 1,785 tons. The use in mixtures increased 2,789 tons while that in materials decreased 4,574 tons.

NPK mixtures supplied more than 76% of the national consumption of potash. The regional portions ranged from 61 to 86%.

TABLE 2.—Regional Change in Consumption of Fertilizers in Year Ended June 30, 1958, from That in the Preceding Year

Region	Change from previous year in consumption as— Mixtures Tons	Materials* Tons	Total* Tons	Mixtures %	Materials* %	Total* %
New England	3,585	—552	3,033	1.0	—0.8	0.7
Middle Atlantic	—17,414	4,299	—13,115	—1.0	2.2	—.7
South Atlantic	—196,487	—56,811	—253,298	—4.1	—5.6	—4.4
East North Central	8,577	114,172	122,749	.3	9.2	2.7
West North Central	—17,374	148,280	130,906	—1.4	15.4	6.0
East South Central	—116,051	—132,547	—248,598	—6.1	—13.8	—8.7
West South Central	—1,047	22,111	21,064	—.2	3.2	1.6
Mountain	12,760	61,253	74,013	22.6	16.4	17.2
Pacific	27,480	73,841	101,321	7.9	5.3	5.8
Total	—295,971	234,046	—61,925	—2.0	3.4	—.3
Hawaii	—5,221	—66,675	—71,896	—8.0	—52.7	—37.5
Puerto Rico	—48,592	—7,320	—55,912	—21.1	—12.2	—19.3
United States	—349,784	160,051	—189,733	—2.4	2.3	—.9

*Excluding the quantity of secondary and trace nutrient materials.

Robert M. Ioset

Paul M. Ritty

TECHNICAL APPOINTMENTS—Dow Chemical Co. has announced two staff appointments in its agricultural chemicals development unit. Robert M. Ioset and Paul M. Ritty are the men involved. Mr. Ioset will develop Dow animal health research for marketing and field use. Mr. Ritty will handle developmental duties for weed, brush and grass control chemicals. He has been with the agricultural chemicals development staff for three years, the past two of which he has been in charge of herbicide and defoliant development in the Southeast.

PATENTS

Continued from page 9

phate rock with phosphoric acid substantially in accord with this reaction:

(1) $Ca_3(PO_4)_2+4H_3PO_4=3CaH_4(PO_4)_2$

thereafter reacting the resulting reaction mixture with sulfuric acid substantially in accord with this reaction:

(2) $3CaH_4(PO_4)_2+3H_2SO_4=3CaSO_4+6H_3PO_4$

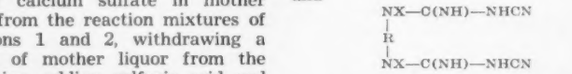
forming a suspension of growing crystals of calcium sulfate in mother liquor from the reaction mixtures of Reactions 1 and 2, withdrawing a stream of mother liquor from the suspension, adding sulfuric acid and the reaction product of Reaction 1 to the withdrawn stream in such proportions that crystals of calcium sulfate will not immediately form by crystallizing from the stream, withdrawing a separate stream of mother liquor from the suspension, removing from the separate stream by vaporization an amount of water the heat of vaporization of which is equivalent to the amount of reaction heat of said Reactions 1 and 2, combining the thus treated streams and returning the combined streams to said suspension.

2,897,162

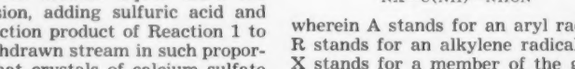
Water-Soluble Organic Nitrogen Compounds. Patent issued July 28, 1959, to Arthur Lowe, James A. Moyse and Alan M. Wooler, Blackley, Manchester, England, assignors to Imperial Chemical Industries, Ltd., of Great Britain. Water-soluble organic nitrogen compounds obtained by heating together in the absence of water and at a temperature between 70° and 200° C., with evolution of ammonia, (1) an N-substituted dicyandiamide selected from the group consisting of dicyandiamides of the formula

ANX—C(NH)—NHCN

and



wherein A stands for an aryl radical, R stands for an alkylene radical and X stands for a member of the group consisting of hydrogen and an alkyl radical, and (2) a linear polyalkyleneimine of the formula



wherein Y stands for a member of the group consisting of —NH_2, OH and halogen, n is a whole number from 2 to 6 and m is a whole number greater than zero.

2,900,297

Fungicidal Composition and Method for its Preparation. Patent issued Aug. 18, 1959, to James C. Wygant, Dayton, Ohio, assignor to Monsanto Chemical Co., St. Louis. The composition is described as being: 1,2,3,4,6,7,7-heptachloro-5-phenylbicyclo (2,2,1)-2-heptene.

2,900,302

Rodenticide. Patent issued Aug. 18, 1959, to John T. Correll, Kalamazoo, Mich., assignor to the Upjohn Co., Kalamazoo. As a rodenticidal composition, a dry food product as an edible carrier and as a toxic ingredient an effective concentration of a compound selected from the group consisting of 2-diphenylacetyl-1,3-indandione and metal, ammonia and amine salts thereof.

SALES MANAGER

MIDLAND, MICH.—The Dow Chemical Co. has named John H. Wallberg as manager of agricultural chemicals sales for the northeastern states. In the newly created position, Mr. Wallberg will make his headquarters in New York as supervisor of that territory, as well as the Buffalo, Camden, Boston and Pittsburgh sales offices.

MILLER

Continued from page 8

and advisors are: Dr. J. H. Hanley, formerly director of the arboretum, University of Washington; Dr. Don C. Mote, formerly head of the department of entomology, Oregon State College; H. B. Barss, formerly head plant pathologist of the office of experimental stations, U.S. Department of Agriculture, and A. B. B. Bouquet, once professor of horticulture, OSC; and P. H. Brydon, formerly curator of the botanical gardens, University of California.

Fertilizer Control Officials to Discuss In-Plant Shrinkage at Annual Convention

WASHINGTON—The annual meeting of the Association of American Fertilizer Control Officials is scheduled for Thursday and Friday, Oct. 15-16 at the Shoreham Hotel, Washington, D. C., according to an announcement by Dr. Bruce Cloaninger, Clemson, S.C., secretary-treasurer.

Among subjects to be covered in the two-day meeting will be a talk on "In-Plant Shrinkage" by Dale C. Kieffer, Smith - Douglass Co., Inc., Norfolk, Va., and "Some Observations on the National Plant Food Institute's Chemical Control Research Project," by Dr. A. J. Duncan, Johns Hopkins University, Baltimore, Md.

A summary of state fertilizer laws will be presented by Dr. Stacy B. Randle, state chemist of New Jersey, New Brunswick, and Dr. Bruce Poundstone, Kentucky State Chemist, Lexington, will give a summary of tonnage reports from the states.

Other topics appearing on the agenda include the use of International Business Machines equipment for tonnage reports, and reports of investigators from the various states.

R. C. Crooks, Florida Department of Agriculture, Tallahassee, will be in charge of a portion of the meeting given to analytical reports.

President of the AAFCO is Dr. F. W. Quackenbush, state control official, Lafayette, Ind., who will address the group on Friday, Oct. 16.

The States Relations Committee will meet at 8 p.m. Thursday, Oct. 15, the program says.

Cyanamid's Canadian Subsidiary to Erect New Nitric Acid Plant

NEW YORK—Contracts have been awarded by American Cyanamid Co.'s Canadian subsidiary for a large nitric acid unit to be built in Canada. The subsidiary, Cyanamid of Canada, Ltd., says the new facility will be erected on the site of the firm's Welland, Ont., plant near Niagara Falls.

The company states that the new plant will have a capacity of 190 tons a day. Output from this plant will be used to augment the already existing facilities on the site. Completion of the new structure is set for the spring of 1960.

Ammonia for the new manufacturing unit will come from a nearby plant recently expanded and modernized.

Arthur G. McKee & Co. of Canada, Ltd., of Toronto was awarded the contracts for construction.

CHAIRMAN NAMED

LARAMIE—G. H. Starr, Wyoming University agricultural extension service director, has been elected chairman of the Great Plains Agricultural Council. He succeeds Louis E. Hawkins, director of the Oklahoma Agricultural Experiment Station, Stillwater.

IMC Contracts with Chemical Workers Union

BARTOW, FLA.—International Minerals & Chemical Corp. has entered into a three-year agreement with Local 613, International Chemical Workers Union, covering the company's phosphate chemicals plant at Bonnie, Fla.

The new contract, which runs until Aug. 15, 1962, proivdes an average basic wage increase of ten cents an hour, with automatic increases of five cents an hour for the second and third years of the new contract.

The contract adds an additional holiday for a tootal of eight per year, and provides for improved vacations calling for three weeks after twelve years, three weeks after ten years starting next year, and four weeks atfer twenty-five years.

A. P. & C. Corp. to Enlarge Mississippi Facilities

ABERDEEN, MISS. — The Aberdeen plant of American Potash and Chemical Corp. will be expanded by 50% at a cost of $1,250,000.

The proposed expansion will increase sodium chlorate production from 15,000 tons to 22,500 tons yearly. One of the primary uses of sodium chlorate is for weed killers and cotton defoliants as well as for industrial chemicals.

The original plant, which went into production last January, was constructed at a cost of $4,400,000. George Adam, plant manager, said construction will get under way early in 1960 with target date for completion set for October of next year.

Bernard H. Lorant

To Head Research and Development Activities For Velsicol Chemical

CHICAGO—Bernard H. Lorant, recently named as assistant to the president of Velsicol Chemical Corp., has been assigned full responsibility for the company's over-all research and development activities. Mr. Lorant will also continue to be in charge of the legal and patent functions.

Mr. Lorant is a graduate of the University of Illinois and John Marshall Law School and joined the corporation in 1946. He was named assistant to the president in April, 1959.

PRODUCTION EDITION

Editorial

Safety Schools More Than Talk . . . Students Gain Ideas on How to Increase Production

FERTILIZER FIRMS which send representatives to the safety schools currently being sponsored by the National Plant Food Institute and the National Safety Council can count on getting something back for their time, effort and expense. The schools are helpful, not only from the standpoint of students' listening to "teachers," but also through exchanging ideas and experiences with fellow foremen, supervisors and safety people in attendance at the schools.

The question-and-answer sessions bring out far more discussions than a formal lecture-type of classroom could possibly accomplish. In the recent Chicago school, for example, Glenn Griffin of the National Safety Council conducted such a discussion in which nearly every "student" participated. Topics covered many phases of production, plant management, rules and their enforcement, and other matters ranging from where to place first aid stations to training part-time employees.

Here are some snatches from conversation at the conference tables, comments on subjects being discussed, and observations on the general tone of the sessions. One group had posed the question of what can be done in plants where the floors become wet and slippery from dust which has taken on moisture. Such conditions cause skidding accidents with trucks and may cause employees to fall.

Others at the school related experiences they have had with this trouble . . . with the conclusion that holding down the quantity of dust is one of the most effective ways of combatting this condition. Other suggestions included soaking up the "mud" with absorbent clays and use of mops. "You have to keep fighting it," the group indicated.

The subject of overhangs in fertilizer storage bins was another topic in which the students took keen interest. It is a common problem; one fraught with danger to the shovel operator who works at the base of a vertical face. The stories related at the meeting about accidents associated with collapsing piles of fertilizer were both sobering and instructive.

Control of "cowboys" who ride herd on mechanized shovels in the plant was also touched upon. Emphasis on enforcement of company rules was pointed out as being effective. Hints and tips on how to choose a man to operate such equipment were forthcoming, with the suggestion that a stable type of individual is the only kind to assign to work of this type.

"As soon as you see reckless tendencies in a driver, warn him about them," it was suggested by one of the supervisors at the school. "Then if he becomes careless again, take him off the job for a few days. Most men like the driving job so well, the enforced vacation from it will make them more thoughtful and considerate of safety when they are put back on."

One elementary matter, and yet one easily tripped over, is that of the supervisor's setting a good example before his men. Too often, it was pointed out at the classes, the supervisor will enter a "goggle" area without bothering to put on a pair of eye protectors. This is noted by the employees and the reaction is likely to be, "Well, if it isn't important for the boss to wear goggles in here, why should I?"

The same principle applies to many other areas, such as by-passing safety rules "only this once" for the sake of expediency. Men in the plant are quick to note these deviations from rules, and are just that much harder to convince that safety is important.

One of the topics bringing warm discussion was that of training temporary men to work safely. "These fellows are not conditioned to fertilizer plant conditions," remarked one observer. "They may take awful chances, like reaching in moving machinery to clean out belts and pulleys . . . and unless someone is around to guide them, they're apt to get hurt."

This was the nub of the question . . . having someone to guide and instruct rush-season help. One supervisor declared that the idea of having regular employees keep an eye on the newcomers might be all right in theory but, in the case of his own plant, the temporary workers outnumbered the regulars nearly 5 to 1.

By this time, the students were all warmed up on the subject and suggestions came quickly and spontaneously. "Hire them ahead of time, so there's time to indoctrinate them," one student offered. This was met by a barrage of information to the effect that pre-hiring is not easy. Unpredictable weather in the spring, plus other factors usually beyond control, makes it difficult to pinpoint the actual day when extra workers will be needed, it was pointed out.

Still, it is at this peak time of year when the industry's accident frequency record moves upward and all conceded that "something ought to be done about it." But what?

Visual aids were finally cited as being of utmost effectiveness. The company with illustrations of its operations and pictures of how to do the job safely has the best opportunity to "zero in" to the consciousness of the new employee. The investment of a day's instruction for new workers may be the difference between a safe and efficient operation with temporary help, and a hectic accident-ridden one.

Other questions included the location of first aid stations. Should there be many scattered around the plant, or a single complete one at a central point? Who is responsible for the maintenance of safety equipment? The foreman? Supervisor? The men using the equipment?

It is entirely possible that some in the fertilizer industry may tire of hearing so much about "safety." Perhaps the term is used so much that it tends to lose its effectiveness, just as people can become immune to different medicines and drugs through long use.

But the fact remains that many plants in the industry have improved both their safety records and their productivity through giving attention to this matter of safety. And many who neglect it should take a second look and get wise to its benefits.

Croplife's Home Office

Croplife®
PRODUCTION EDITION

BPA — *Member of Business Publications Audit*

NBP — *Member of National Business Publications*

CROPLIFE is a controlled circulation journal published weekly. Weekly distribution of each issue is made to the fertilizer manufacturers, pesticide formulators and basic chemical manufacturers. In addition, the dealer-distributor-farm adviser segment of the agricultural chemical industry is covered on a regional (crop area) basis with a mailing schedule which covers consecutively, one each week, three geographic regions (South, Midwest and West) of the U.S. On the fourth week, production personnel in fertilizer manufacturing and pesticide formulating plants throughout the U.S. are covered in depth. To those not eligible for this controlled distribution, Croplife's subscription rate is $5 for one year ($8 a year outside the U.S.). Single copy price 25¢.

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Industry Meetings

Sept. 14-17—American Chemical Society's division of fertilizer and soil chemistry, Haddon Hall Hotel, Atlantic City, N.J.

Sept. 17—New Jersey Fertilizer Conference, Rutgers University, New Brunswick, N.J.

Sept. 24-25—Annual Northeastern Fertilizer Conference of National Plant Food Institute, Biltmore Hotel, New York.

Sept. 30-Oct. 1—Fourth Southeastern Fertilizer Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

Oct. 15—Conference on Chemical Control Problems, sponsored by NPFI, Shoreham Hotel, Washington, D.C.

Oct. 13-14—Fall meeting, Western Agricultural Chemicals Assn., Villa Motel, San Mateo, Cal.

Oct. 16—Assn. of American Fertilizer Control Officials, annual meeting, Shoreham Hotel, Washington, D.C.

Oct. 16-17—American Pesticide Control Officials, annual meeting, Shoreham Hotel, Washington, D.C.

Oct. 21-23—National Agricultural Chemicals Assn. 26th annual meeting, French Lick-Sheraton Hotel, French Lick, Ind.

Oct. 29-30—Far West Fertilizer Safety School, Hacienda Motel, Fresno, Cal.

Nov. 4-6—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D.C.; Dr. Vincent Sauchelli, National Plant Food Institute, chairman.

Nov. 5-6—Far West Fertilizer Safety Training School, Fresno, Cal.

Nov. 8-10—National Fertilizer Solutions Assn., annual convention, Statler Hilton Hotel, St. Louis, Mo.

Nov. 9-11—36th Annual Convention, California Fertilizer Assn., Fairmount Hotel, San Francisco, Cal.

Nov. 12-13—Southwest Fertilizer Safety School, Tropicana Motor Hotel, Pasadena, Texas.

Nov. 30-Dec. 4—27th Exposition of Chemical Industries, New York Coliseum, New York.

Dec. 7-10—Western Canadian and North Central Weed Control Conferences, Royal Alexandra Hotel, Winnipeg, Man., Canada.

1960

Jan. 13-15—Ninth annual convention, Agricultural Ammonia Institute, Statler Hilton Hotel, Dallas, Texas.

New Chemist

NEW YORK—Union Carbide Chemicals Co., division of Union Carbide Corp., has appointed Robert D. West to the position of aerosol formulation chemist. Mr. West will formulate and test new aerosol products for Carbide's Ucon propellent customers. Following his graduation from the University of Pittsburgh, where he received a bachelor of science degree in chemistry, Mr. West was employed in product research by Purex Corp., Ltd., Southgate, Cal. He was later engaged by Reed Research Corp., Shelton, Conn., to formulate and test aerosol products.

Researcher Named

FALLS CHURCH, VA.—Hazleton Laboratories, independent biological research firm in Falls Church, Va., and Palo Alto, Cal., has added two new research specialists to its scientific staff, Dr. Lloyd W. Hazleton, president, has announced. Donald T. Forman, Ph.D., will head the biochemistry section in the pharmacology-biochemistry department. Jiro Kodama, Ph.D., will supervise toxicological investigations in the same department.

Merger Planned Between Oil and Chemical Firms

LOS ANGELES—Eastern States Petroleum & Chemical Corp. has announced that it is working out the details of an agreement to merge with Signal Oil and Gas Co. of Los Angeles, Cal.

In a joint announcement by Richard B. Kahle, chairman of the board and chief executive officer, and Reginald N. Blaize, president of Eastern States Petroleum & Chemical Corp., it was stated that the agreement provides only for an exchange of stock.

The announcement further stated, "As the Gulf Coast's leading independent oil refinery, we are happy to join forces with one of the largest independent oil companies in the West Coast area. Signal Oil and Gas Co.'s domestic and foreign production together with its other diversified operations will supplement Eastern States' own widespread operations and enable the new organization to become an integrated company and market and exchange its products throughout the world."

In this transaction Signal is acquiring a 60,000 barrel complete and modern refinery, a petro-chemical plant and research center, located on the Houston ship channel, together with deepwater marine terminals and an interest in the Rancho pipeline which extends from West Texas to Houston. Signal is one of the oldest independent oil companies in the West Coast area, having been operating over 30 years.

CALENDAR FOR 1959-60

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Bemis Bro. Names B. L. Willmore to New Post in Firm

ST. LOUIS—B. L. Willmore, head of the sales economic section and assistant secretary of Bemis Bro. Bag Co. has been named assistant to the vice president in charge of procurement and materials, H. P. Claussen. Later this year, Mr. Willmore will attend the fall session of the Advanced Management Program at Harvard University Graduate School of Business Administration.

B. L. Willmore

Mr. Willmore joined Bemis in 1946 as price economist at the company's general sales department, St. Louis. In 1952 he was appointed supervisor of pricing and in 1957 head of the sales economic section. He was elected assistant secretary of the company in 1958.

Prior to joining Bemis, Mr. Willmore was affiliated with the office of Price Administration. He was associated with the Bureau of Agricultural Economics, U.S. Department of Agriculture, from 1938-41.

A native of Rexburg, Idaho, Mr. Willmore was graduated from the University of Idaho in 1937 with a B.S. degree in agricultural economics.

Iowa Fertilizer Workshop Announced by NPFI

WASHINGTON—Iowa has been chosen as the site for one of two fertilizer promotion workshops that will be sponsored by the National Plant Food Institute during 1959-60. Location of the other workshop has not yet been finally determined, but an announcement is expected in the near future.

The Iowa workshop is scheduled for Dec. 10, and probably will be held either at Waterloo or Des Moines. It will be open to salesmen and other personnel of NPFI member companies only and any dealers that they may wish to invite.

Program plans are being developed in consultation with NPFI members doing business in Iowa.

USI Names Chicago Division Sales Manager

NEW YORK—Edward C. Richardson has been appointed Chicago division sales manager for U.S. Industrial Chemicals Co., division of National Distillers & Chemical Corp., New York.

Edward Richardson

The announcement was made by A. R. Ludlow, Jr., vice president in charge of sales. Mr. Richardson replaces the former Chicago sales manager, George H. Stanton, who is now the company's director of field sales.

Mr. Richardson, who holds a chemistry degree from Cornell University, has been with U.S.I. since 1940, and was Boston division sales manager for the company from 1950 until the time of his new appointment.

HEAD OF DEPARTMENT

FAYETTEVILLE, ARK.—The appointment of Dr. J. P. Fulton as head of the department of plant pathology at the University of Arkansas was announced by Dr. John W. White, vice president for agriculture. Dr. Fulton succeeds Dr. E. M. Cralley, who has been named director of the University's Agricultural Experiment Station. Both appointments were effective July 1.

Classified Ads

Classified advertisements accepted until Tuesday each week for the issue of the following Monday.

Rates: 15¢ per word; minimum charge $2.25. Situations wanted, 10¢ a word; $1.50 minimum. Count six words of signature, whether for direct reply or keyed care this office. If advertisement is keyed, care of this office, 20¢ per insertion additional charged for forwarding replies. Commercial advertising not accepted in classified advertising department. Display advertising accepted for insertion at minimum rate of $11 per column inch.

All Want Ads cash with order.

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PLANT SUPERINTENDENT, AGRICULTURAL chemicals, full charge formulating, packaging, etc., with growing company in Rocky Mountain area. Salary commensurate with experience and ability. Address Ad No. 5148, Croplife, Minneapolis 40, Minn.

OPPORTUNITY IN EL PASO TEXAS—for qualified young man, with experience in selling to the institutional trade—such as grocery stores, hotels, restaurants, hospitals, schools, etc. Experienced in selling canned goods, flour, sugar, beans, rice, etc. Write giving details of sales experience, age, references, photo, etc., to: Mr. E. C. Heid, President, Heid Bros. Corp., P. O. Box 98, El Paso, Texas.

OPPORTUNITY FOR YOUNG WOMAN IN El Paso, Texas—25 to 35 years of age, experienced, well qualified secretarial-stenographer. Must have superior speed in taking dictation and transcribing notes rapidly and accurately. Must be willing, ambitious, hard working—and with pleasing personality and the ability to work with others. If interested write, giving full details of experience, ability, character references, etc., enclosing small recent snapshot or photo to: Mr. E. C. Heid, President, Heid Bros. Corp., P. O. Box 98, El Paso, Texas.

OPPORTUNITY FOR YOUNG MAN 30 TO 32 years of age—in El Paso, Texas. Must be fully qualified general bookkeeper. Able to handle general ledger, accounts receivable, insurance, income tax returns, and every phase of bookkeeping. Must be sober, industrious, ambitious and capable. Able to work well with others. Knowledge of Spanish helpful. If interested write, giving full details of background, experience, character references, references as to ability, etc., and enclose small recent snapshot or photo. Mr. E. C. Heid, President, Heid Bros. Corp., P. O. Box 98, El Paso, Texas.

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FOR SALE—30,000 GALLON ANHYDROUS ammonia bulk plant. Practically new. Handled approximately 15 car loads. Bargain. Terms if desired. Address Ad No. 5102, Croplife, Minneapolis 40, Minn.

MACHINERY FOR SALE

FOR SALE

Complete Granulating Equipment
I. C. Bagging Unit
Fisher Porter Meter & Recorder
All in good condition

Dixie Fertilizer Co., Inc.
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